Lewis & Clark County

Helena	Davis Gulch II	PA # 25-040
	Spring Hill Tailings	PA # 25-067
	Lady Luck	PA # 25-073
	Mother Lode	PA # 25-363
Lincoln	Seven-Up Pete/Rover	PA # 25-020
	Blackfoot Tailings	PA # 25-322
Marysville	Bald Mountain	PA # 25-061
	Big Ox Millsite	PA # 25-115
	Big Ox Mine	PA # 25-116
	Belmont	PA # 25-167
	Piegan-Gloster Millsite	PA # 25-172
	Empire Millsite	PA # 25-175
	Bald Butte Millsite	PA # 25-179
	Argo Millsite	PA # 25-314
	Wildcat	PA # 25-317
	Goldsil Millsite	PA # 25-365
Orphir	Victory/Evening Star	PA # 25-010
Rimini	Tenmile	PA # 25-005
	Red Water	PA # 25-007
	Valley Forge/Susie	PA # 25-008
	Lower Tenmile/Engstrom	PA # 25-030
	Armstrong	PA # 25-102
	Beatrice	PA # 25-103
	Red Mtn. - North & #13	PA # 25-019
	Upper Valley Forge	PA # 25-280 - 282
	SE SE S13	PA # 25-294

LEWIS AND CLARK

HELENA

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MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: DAVIS GULCH II PA#: 25-040

Date: August 19, 1993 Time: 1930-2000

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Calm; clear; approx. 55°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: Adit portal; #2: WR-1; #3: WR-1. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Very minor site.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close HMO

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): DAVIS GULCH II PA#: 25-040

Legal Description: T 9N ;R 4W ;Sec. 1 , NW1/4 SE1/4 ___1/4

County: LEWIS & CLARK Mining District: HELENA

Latitude: N 46° 34' 16" Longitude: W 112° 02' 54"

Primary Drainage Basin and Code: Tenmile/10030101
Secondary Drainage Basin: Dry Gulch (Davis Gulch)

USGS Quadrangle map name(s): Helena

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Robert Ryckman, 805 W. Main, Helena, MT 59601.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Adit door has been installed possibly by MDSL.

General site features: Elevation 4600' , Slope 10° , Aspect Eastern

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 0.05 acres.
Dimensions:___

Predominant vegetation types: Ponderosa pine, juniper, blue bunch wheat grass, weeds

Access: roads - good X ,poor___,4wd___,trail X .
Other logistical considerations (proximity to other sites). Very close to Helena up Davis Gulch.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies above and on west side of Dry Gulch. Dry Gulch drains north into the Helena valley. The site is underlain by the Boulder Batholith.

Mining/milling history, ore type/tenor, host rock, gangue: Very small exploratory adit; no information available.

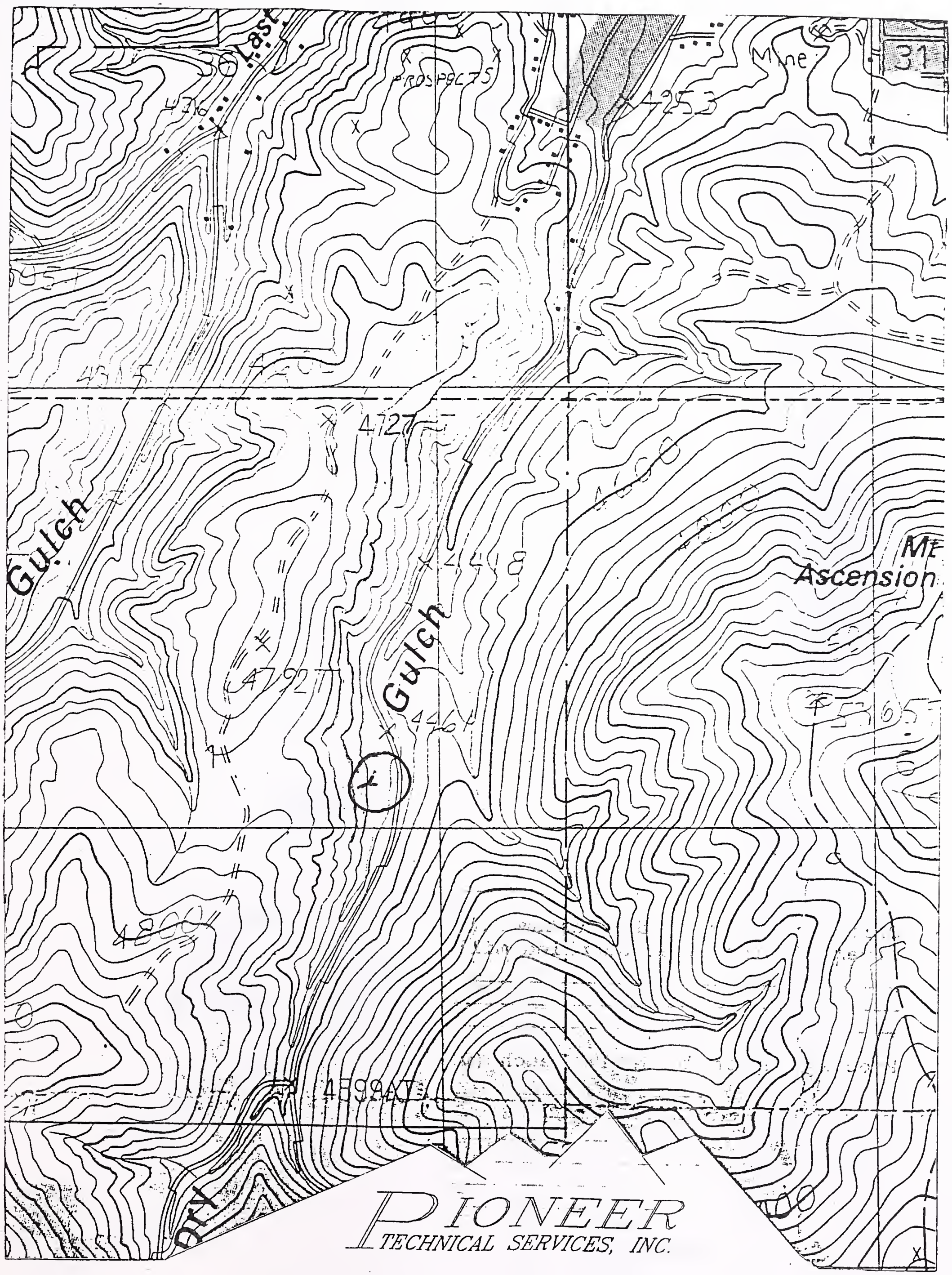
Mine Operation?
Shafts - Yes___, No_X_, # ____, Comment
Adits - Yes_X_, No___, # _1_, Comment Gated; lock is missing.
Pits - Yes___, No_X_, # ____, Comment
Placers - Yes___, No_X_, # ____, Comment
Other - Yes___, No_X_, # ____, Comment

Mill Operation? Yes____, No_X_. If yes answer the next three questions:

Period(s) of Operation: N/A

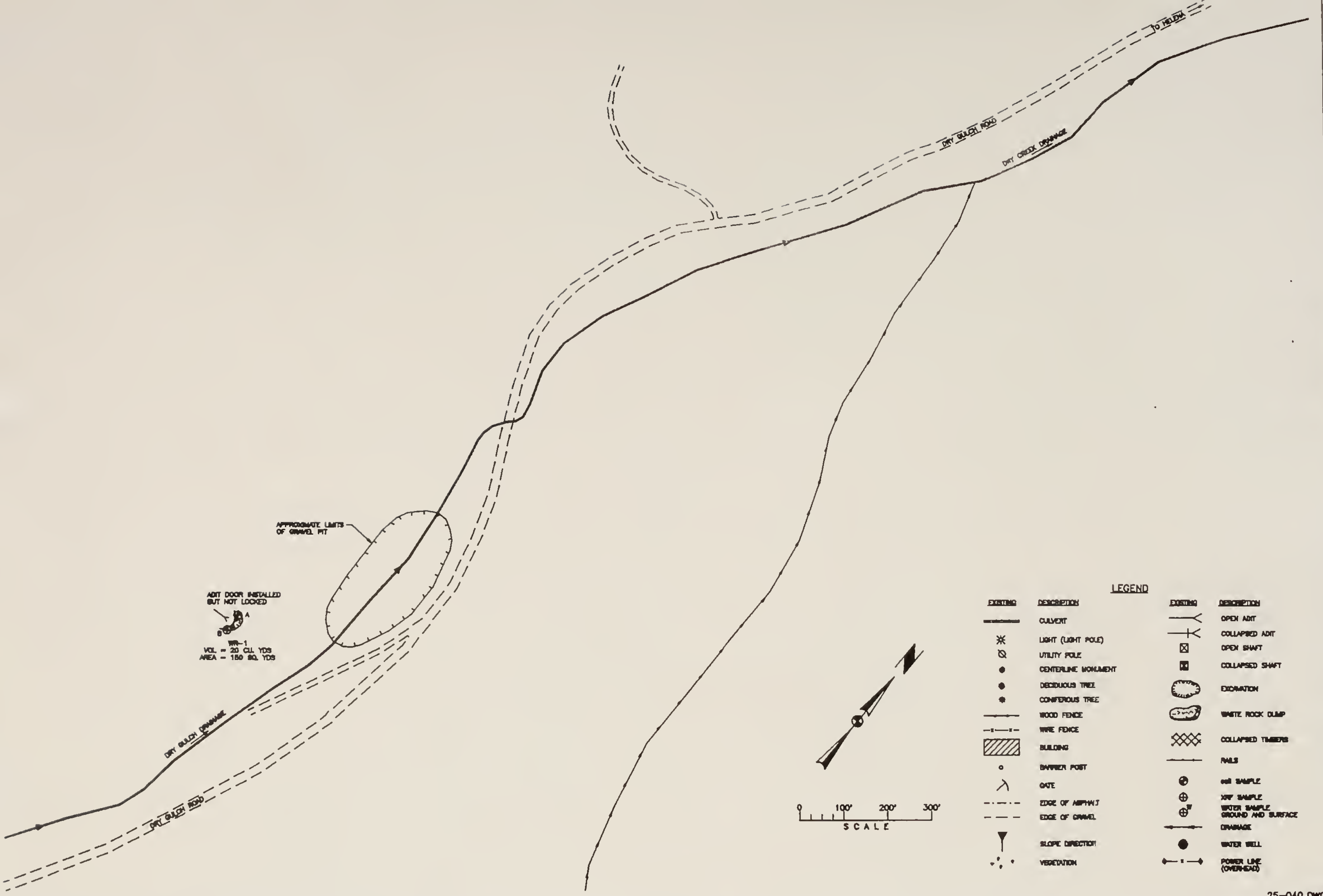
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

DAVIS GULCH II, P.A. NO. 25-040
T09N, R04W, SECTION 01
SCALE: 1" = 1000'



DRAWN VWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

TDSH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

DAVIS GULCH II PA# 25-040
HELENA DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-040.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	20	North side of dump	None	7.0 (D)	0.05	25-040-WR-1	08/19/93 2300	T-Metals, ABA
WR-1B	WR		South side of dump	None	7.0 (D)	0.03			

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-040-WR-1 is composite of WR-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 1,118

Distance to nearest well used for drinking? Approximately 1/2 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Very shallow workings; dump material does not contain elevated metals.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):____________________

Dry streambeds: Yes X , No___, Name(s): Dry Gulch (Davis Gulch) is approx. 100 feet from the mine - no direct runoff path.

Other surface water: Yes____, No X , Name(s)/Description:__________

Waste materials within any floodplain: Yes____, No X Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:____________

Distance between waste source(s) and nearest surface water body (ft)?
N/A

Surface water draining onto or through waste sources: Yes____, No X ,
Describe: N/A

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
N/A

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater X ; Comments

Nearest residence(ft or miles)? Approximately 1/2 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	1,350	1,080	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_,
Describe:____

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe: Target practice in adjacent gravel pit.

Accessibility - Fences, warning signs, closed roads? Unrestricted
____

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________________
Wilderness Area - Yes___, No_X_, Comment________________
T&E Species Habitat - Yes___, No_X_, Comment________________
Bat Habitat - Yes_X_, No___, Comment Possible

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit with door, but it is not closed or locked.
____

Hazardous structures: Yes___, No_X_, Number____, types and locations:_
____
____

Unstable highwalls, pits, trenches, slopes: Yes____, No_X_, Number____,
types and locations:____
____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:____
____
____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________
____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands Portal Inventory for Davis Gulch II, Prepared by Daphne Digrindakis, September 12, 1982.

USGS, Topographic Map, Helena, Montana, 7 1/2 minute, Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

DAVIS GULCH II
PA NO. 25-040

Davis Gulch II PA# 25-040
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/19/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-040-WR-1	18.3 J	50.5 J	0.8	22.5	27.6	17.5 J	13500 J	0.74 J	604 J	63	10.8 J	5.35 U	30.1 J	NR
BACKGROUND	27.1	165 JX	1.3 J	13.6	17.9	29.7	23300	0.070 JX	672	17.9 J	36.3 J	6.98 UJ	76.4	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-040-WR-1	<0.01	0	365	365	<0.01	<0.01	<0.01	0	365

LEGEND

WR1 - Composite of subsamples WR1A and 1B.
BACKGROUND - From the Franklin Mine (25-073-SS-10).

XRF ANALYSIS RESULTS

DAVIS GULCH II
PA NO. 25-040

Mine Name: Davis Gulch II PA# 25-040
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-040-WR1-A		12998.2	112382	1395.97		1238.14	21022.9	252.773 *	89.4853 *	65.1248 *	38.4558 *	93.6815	133.57		6.28203 *		83.714	151.43 *		376.829			17.6383
25-040-WR1-B		20368.4	106851	1978.06		1157.99	22151.2		72.004 *	62.2509 *	32.142 *	97.4186	163.049		6.89024 *		111.055			399.934			18.9393
25-040-WR-1-COMP		19484.8	104059	1718.51		976.335 *	23084.7	303.541 *	71.0145 *	56.4431 *	32.5393 *	97.2339	158.143	42.1645 *	6.21413 *		92.6312		53.4306 *	371.699			21.5294

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

DAVIS GULCH II
PA NO. 25-040

AIMSS SCORESHEET

SITE NAME: DAVIS GULCH II
PA NUMBER: 25-040

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
6		WELLS - 1 MI. x 2.5		162.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		1053
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	1220.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	244

SURFACE WATER PATHWAY

11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19	SW - TARGETS	FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	0
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0

AIR PATHWAY

25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		1
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
29		POPULATION - 4 MILES		10000
30		NEAREST RESIDENCE		5
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	10005
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	100

DIRECT CONTACT PATHWAY

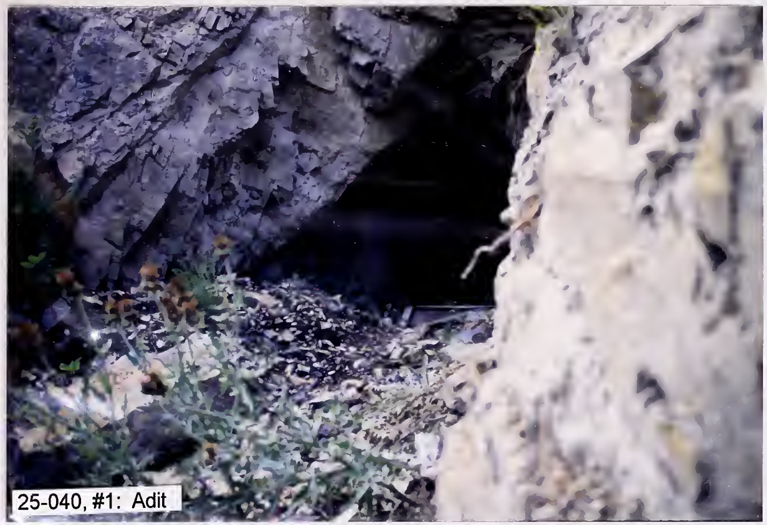
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	20
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	5

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.00**

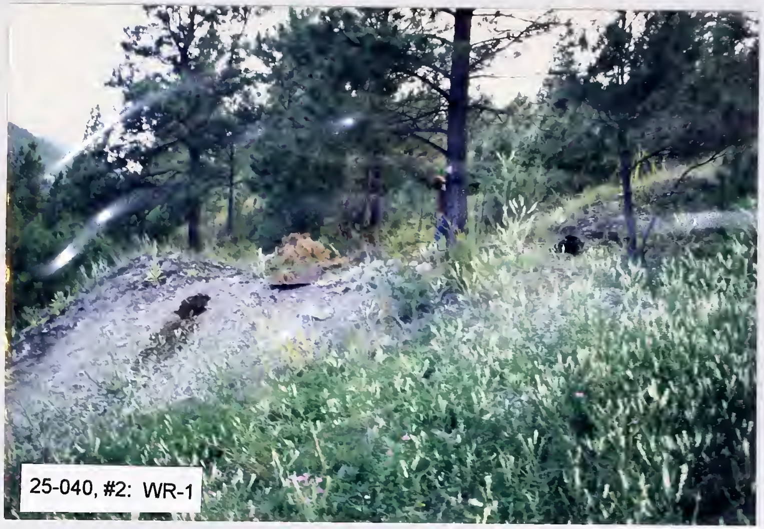
SITE NAME: DAVIS GULCH II
PA NUMBER: 25-040

SITE SAFETY

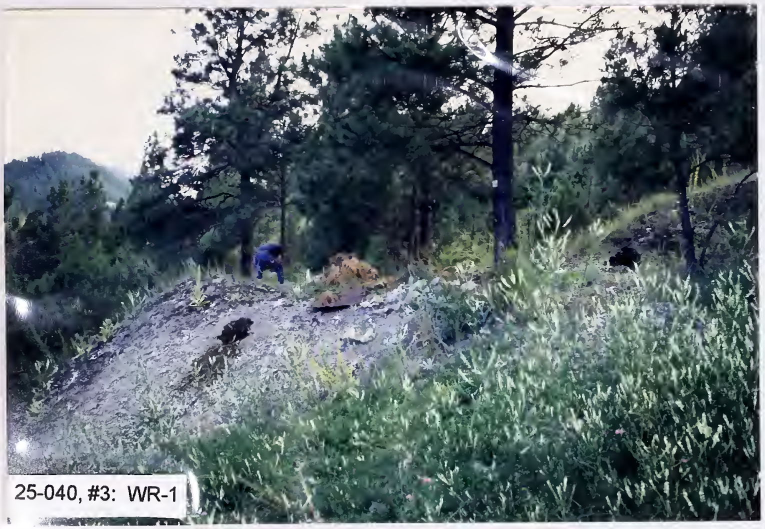
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	50
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	20
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**20.00**



25-040, #1: Adit



25-040, #2: WR-1



25-040, #3: WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SPRING HILL TAILINGS PA#: 25-067

Date: August 30, 1993 Time: 0900

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Flammang, Pioneer
Pierson, TD&H

Visitors: Motorbike and off-road vehicle drivers

Weather/Seasonality Observations: Cool to warm (33-65°F); sunny; breezy; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: Hole TP-1A upper tails; #2: Adit #1 HMO; #3: Panorama of TP-1 looking east from west end; #4,#5: Panorama of TP-2; #6: TP-1 dam face; #7: TP-3; #8: Washed out tails, below TP-3. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Site was accessed by truck up Grizzly Gulch Road.

Other Hazardous Materials/Substances Present:

General Comments on Potential Remedial Alternatives: Recontour tailings (TP-1 and TP-2), cover, and revegetate. Consolidate tailings from TP-3 with other ponds out of drainage and reclaim.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SPRING HILL TAILINGS PA#: 25-067

Legal Description: T 9N ;R 4W ;Sec. 4 , SE1/4 SE1/4 ___1/4

County: LEWIS & CLARK Mining District: HELENA

Latitude: N 46° 33' 29" Longitude: W 112° 06' 22"

Primary Drainage Basin and Code: Ten Mile Creek/10030101
Secondary Drainage Basin: Grizzly Gulch

USGS Quadrangle map name(s): Helena

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Owner(Include address and phone when available): Evans R. Dick, Ardic Exploration & Dev., 641 W. 59th Street, New York, NY 10019. (212) 757-5576; Helena National Forest.

Relationship to other mines/sites in the area/district: Across the valley from Whitlach; placer activity farther up Grizzly Gulch.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 4800' , Slope 5° ,
Aspect Northeast

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 20 acres.
Dimensions: 600 feet x 1,400 feet

Predominant vegetation types: Ponderosa pine and aspen

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Able to drive to tailings ponds.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 52 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in a dry unnamed valley of the perennial Grizzly Gulch. Grizzly Gulch flows northwest past the bottom of the site.

Mining/milling history, ore type/tenor, host rock, gangue: Lode discovery at Spring Hill occurred in 1865. Originally, high iron content ore was shipped to smelter at Wickes. In 1930, Spring Hill was Montana's largest producer of gold. From September to December of 1934, 1,084 ounces of gold was produced; 2,031 ounces of gold was produced from March to May of 1935.

Mine Operation?
Shafts - Yes___, No X , # ____, Comment
Adits - Yes X , No___, # 1 , Comment Above upper tailings
Pits - Yes___, No X , # ____, Comment
Placers - Yes___, No X , # ____, Comment
Other - Yes___, No X , # ____, Comment

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: 1928-1929, cyanide

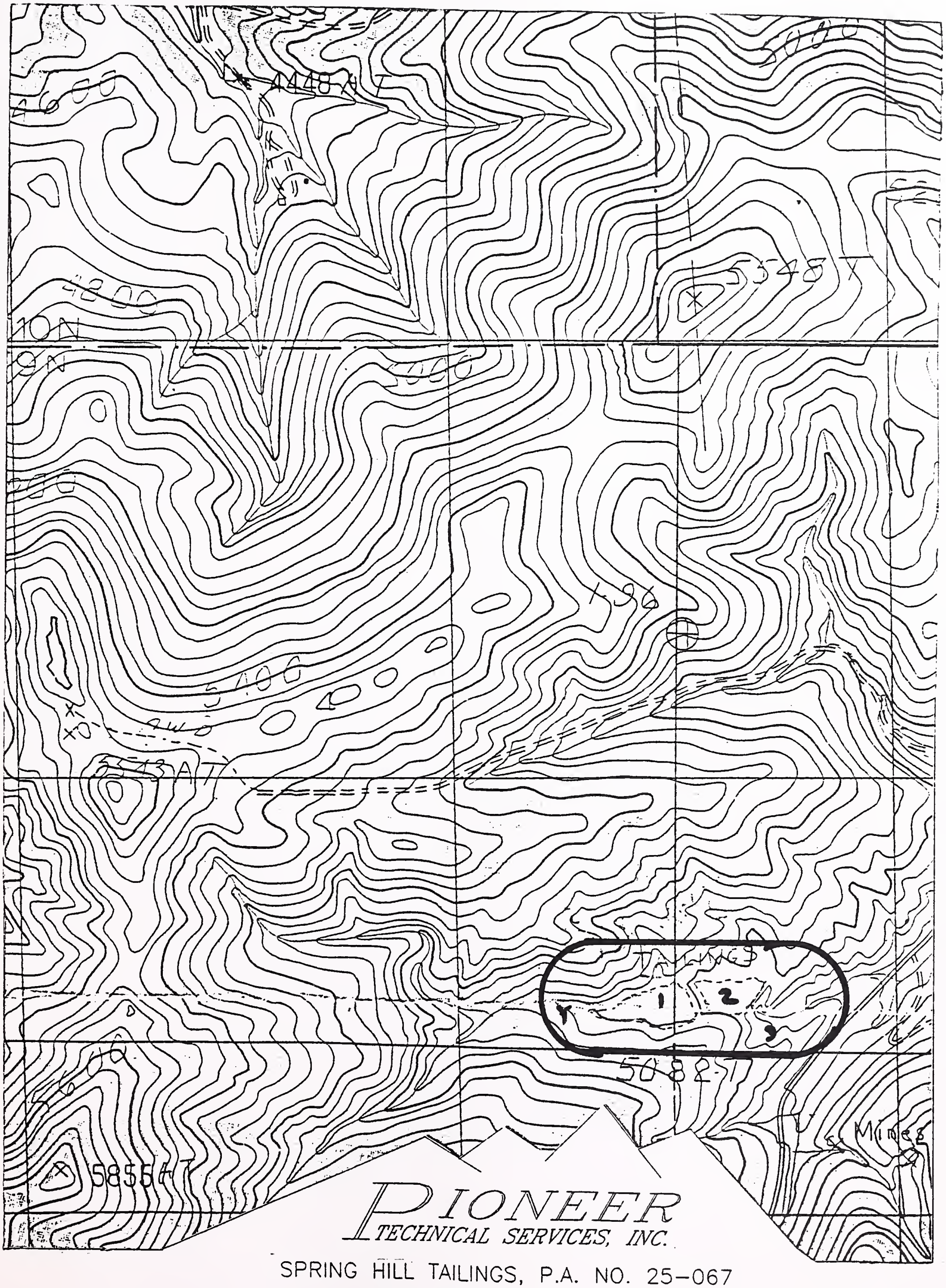
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Spring Hill Mine

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting? 1928-1929, cyanide plant; 1929-1931, flotation plant; 1934-December 1934, new flotation plant; 1935-unknown, concentrating mill-flotation mill-300 tons/day.

Montana Bureau of Mines and Geology
Water Well Log Data

11/12/1993

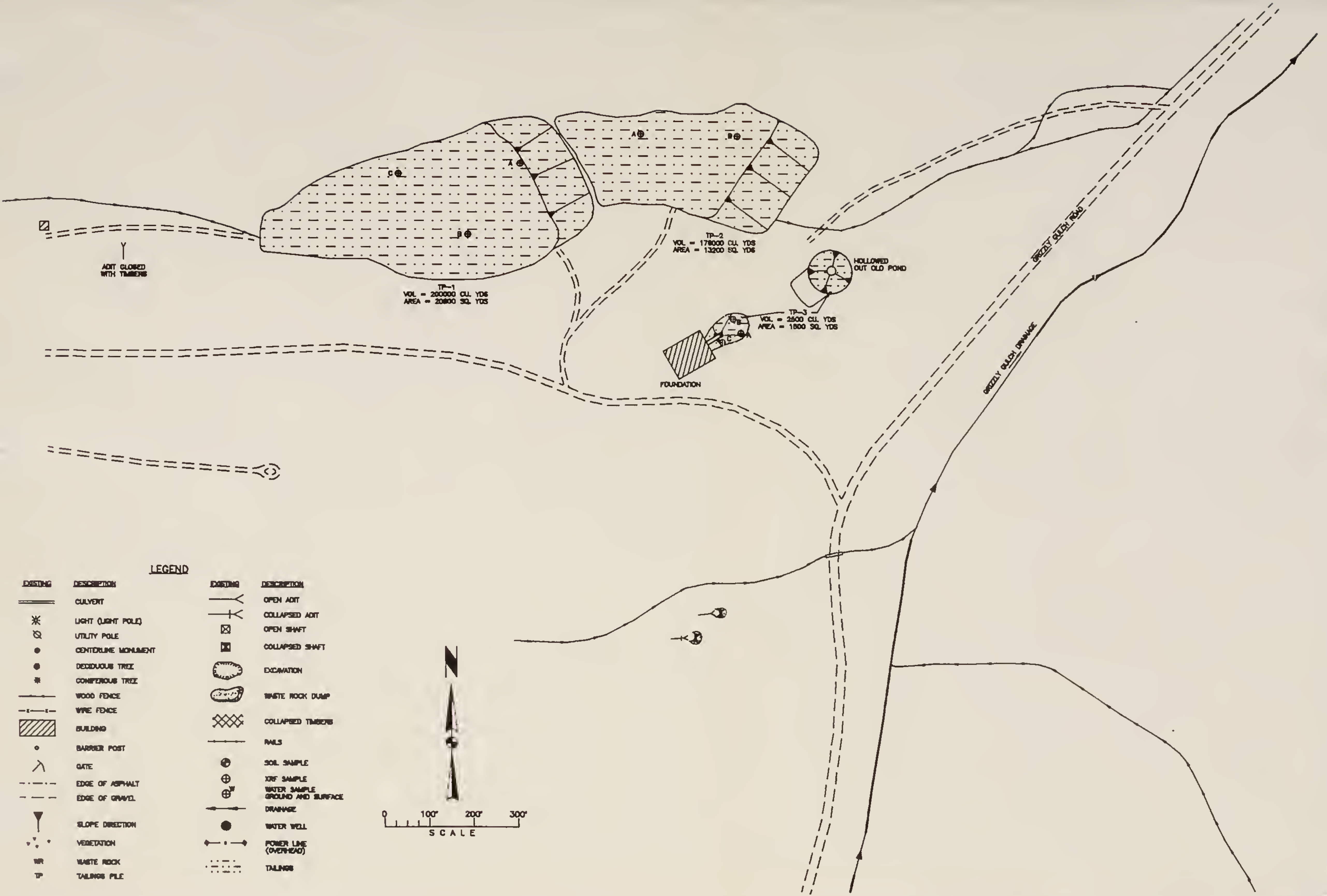
ll No.	Location	Depth	Yield	Static Water Level
M:62935	10N 04W 33	35.0	20.0	20.00
M:62936	10N 04W 34	12.0	3.0	Flowing
M:62937	10N 04W 34 C	90.0	15.0	22.00
M:62938	10N 04W 35	200.0	10.0	150.00
M:62939	10N 04W 35	200.0	15.0	95.00
M:62940	10N 04W 35 AC	315.0	1.0	120.00
M:62941	10N 04W 35 AD	300.0	0.0	0.00
M:62942	10N 04W 35 CAC	475.0	5.0	317.00
M:62943	10N 04W 35 CAD	670.0	5.0	565.00
M:58900	09N 04W 02	145.0	30.0	65.00
M:58899	09N 04W 02	208.0	6.0	25.00
M:128024	09N 04W 02 DD	310.0	15.0	100.00
M:58901	09N 04W 03	90.0	7.0	33.00
M:58902	09N 04W 03 CD	79.0	20.0	30.00
M:58904	09N 04W 09	207.0	3.0	80.00
M:123544	09N 04W 09 CCC	451.0	8.0	162.00
M:58905	09N 04W 09 DD	402.0	5.0	125.00
M:58908	09N 04W 10	46.0	30.0	0.00
M:58911	09N 04W 10	50.0	0.0	0.00
M:58906	09N 04W 10	95.0	12.0	79.00
M:58912	09N 04W 10	40.0	30.0	0.00
M:58909	09N 04W 10	38.0	8.0	0.00
M:58910	09N 04W 10	80.0	10.0	15.00
58907	09N 04W 10	44.0	10.0	22.00
130188	09N 04W 10 CC	305.0	20.0	180.00
58913	09N 04W 10 CCB	105.0	30.0	16.00
M:58915	09N 04W 10 D	43.0	8.0	17.00
M:58914	09N 04W 10 D	38.0	8.0	0.00
M:131264	09N 04W 10 DAD	101.0	12.0	34.00
M:58916	09N 04W 10 DD	140.0	15.0	40.00
M:58917	09N 04W 11	187.0	10.0	28.00
M:58923	09N 04W 11	124.0	10.0	64.00
M:58921	09N 04W 11	88.0	9.0	50.00
M:58919	09N 04W 11	35.0	12.0	27.00
M:58920	09N 04W 11	0.0	0.0	0.00
M:58922	09N 04W 11	146.0	9.0	20.00
M:58918	09N 04W 11	64.0	0.0	20.00
M:58924	09N 04W 11 AA	0.0	0.0	30.00
M:58925	09N 04W 11 C	105.0	5.0	25.00
M:58926	09N 04W 11 CC	46.0	20.0	12.00
M:5496	09N 04W 11 CCC	0.0	0.0	0.00
M:58927	09N 04W 11 CCC	30.0	10.0	15.00
M:58929	09N 04W 11 CCC	30.0	10.0	10.00
M:58928	09N 04W 11 CCC	30.0	10.0	10.00
M:5495	09N 04W 11 CCC	0.0	0.0	0.00
M:58930	09N 04W 11 CCD	98.0	15.0	30.00
M:58932	09N 04W 11 D	160.0	20.0	40.00
M:58931	09N 04W 11 D	185.0	9.0	71.00
:58933	09N 04W 11 DA	185.0	6.0	38.00
:58934	09N 04W 11 DC	180.0	6.0	48.00
58935	09N 04W 11 DCA	148.0	15.0	16.00
M:58936	09N 04W 11 DD	249.0	25.0	53.00



PIONEER
TECHNICAL SERVICES, INC.

SPRING HILL TAILINGS, P.A. NO. 25-067

T09N, R04W, SECTIONS 03, 04
SCALE: 1" = 1000'



DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SPRING HILL TAILINGS PA# 25-067
HELENA DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-067.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 90% fine sand, 10% clay; carbonates TP-3 all clay.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-1 is possibly 60 feet deep at east end (no bottom reached) with brown sands/clay 0-5 feet or 6 feet and gray sand/clay below. TP-2 is possibly 80 feet deep with brown sand/clay 0-5 feet and gray clay/sand below. No stratification noticeable in TP-3 pile; it is approximately 10 feet deep on average and was possibly reprocessed from the lower dugout tailings.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Mostly dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No dams; erosion gullies and off-road vehicle paths observed on both faces. TP-3 is a relatively small pile.

Comments on potential for mitigation: Recontour ponds faces to gentler slopes, topsoil and seed.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Flammang, Pierson*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	200,000	Near east end of upper pond; 0'-2'	None	6.8 (D)	0.04	25-067-TP-1A	8/31/93 1330	T-Metals, ABA
TP-1A-B	TAIL		Near east end of upper pond; 2'-5'	None	6.45 (D)	0.035			
TP-1A-C	TAIL		Near east end of upper pond; 5'-12'	None	6.2 (D)	0.03	25-067-TP-1B	8/31/93 1345	T-Metals, ABA
TP-1A-D	TAIL		Near east end of upper pond; 12'-15'	None	6.25 (D)	0.02			
TP-1A-E	TAIL		Near east end of upper pond; 15'-19'	None	6.3 (D)	0.04			
TP-1B-A	TAIL		South side of upper pond, near middle; 0'-4'	None	6.6 (D)	0.02			
TP-1B-B	TAIL		South side of upper pond, near middle; 6"-9'	None	7.0 (D)	0.02			
TP-1B-C	TAIL		South side of upper pond, near middle; 9'-15'	None	7.0 (D)	0.03			
TP-1C-A	TAIL		Near north side of upper pond, near middle; 0'-4.5'	None	6.4 (D)	0.03			
TP-1C-B	TAIL		Near north side of upper pond, near middle; 4.5'-7'	None	6.6 (D)	0.03			
TP-1C-C	TAIL		Near north side of upper pond, near middle; 7'-15'	None	7.45 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-067-TP-1A is a composite of TP-1A-A and -1A-B, TP-1B-A, and TP-1C-A and -1C-B. 25-067-TP-1B is a composite of TP-1A-C, -1A-D, and -1A-E, and TP-1B-B, 1B-C, and -1C-C. *Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: Tuesday, Flammang, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-2A-A	TAIL	176,000	Near west end of lower pond on north side; 0'-2.5'	None	6.4 (D)	0.03	25-067-TP-2A	8/31/93 1400	T-Metals, ABA
TP-2A-B	TAIL		Near west end of lower pond on north side; 2.5'-6'	None	7.0 (D)	0.03			
TP-2A-C	TAIL		Near west end of lower pond on north side; 6'-10'	None	5.8 (D)	0.03			
TP-2A-D	TAIL		Near west end of lower pond on north side; 10'-15'	None	5.8 (D)	0.035	25-067-TP-2B	8/31/93 1415	T-Metals, ABA
TP-2B-A	TAIL		About 1/2 the way on north side of lower pond; 0'-2'	None	6.1 (D)	0.03			
TP-2B-B	TAIL		About 1/2 the way on north side of lower pond; 2'-4.5'	None	5.35 (D)	0.02			
TP-2B-C	TAIL		About 1/2 the way on north side of lower pond; 4.5'-8.5'	None	5.95 (D)	0.03			
TP-2B-D	TAIL		About 1/2 the way on north side of lower pond; 9'-13'	None	7.4 (D)	0.04			
TP-3A	TAIL	2,500	Northeast of mill building	None	< 3.5 (D)	0.03	25-067-TP-3	8/31/93 1320	T-Metals, ABA
TP-3B	TAIL		North of mill building	None	< 3.5 (D)	0.02			
TP-3C	TAIL		Furthest northeast of mill buildings	None	< 3.5 (D)	0.02			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-067-TP-2A is a composite of TP-2A-A through -2A-C, and TP-2B-A and -2B-B. 25-067-TP-2B is a composite of TP-2A-D, and TP-2B-C and -2B-D. 25-067-TP-3 is a composite of TP-3A through and -3C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_1084_

Distance to nearest well used for drinking?_Approx. 1/4 mile on Grizzly Gulch_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X_.
Very little water on the site; metal values in tails are only slightly elevated, except for small pile of TP-3, which has elevated arsenic values. Carbonate tailings restrict movement of metals.

Other observations/notes: Spring across from tailings was sampled which supplies drinking water to Tom Stephens, 523 Grizzly Gulch, Helena, MT 59701. Water is collected by pipe directly into a cement cistern located approximately 1/4 of a mile upstream from his house. The water is not filtered or otherwise treated prior to use. Water from the cistern was sampled with a bailer. The nearest well located down drainage is reported to be 250 feet deep.

GROUNDWATER INVENTORY FORM

SAMPLERS: Tuesday, Pierson, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	RW	Spring that supplies the residence	N/A	7.73	440	247.3	N/A	185	5	25-067-GW-1	08/31/93 1120	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	RW	Duplicate of GW-1	N/A	7.73	440	247.3	N/A	185	5	25-067-GW-2	08/31/93 1140	T-Metals, CN-
GW-3	BLNK	QA/QC blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25-067-GW-3	08/31/93 1200	T-Metals, CN-

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No____, Name(s): Unidentified tributary of Grizzly Gulch but not connected. Grizzly Gulch Road without culvert intercepts dry drainage from the site.

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): TP-1, -2, and -3 are in dry drainage.

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 0.05 cfs , Average Flow: Dry

Distance between waste source(s) and nearest surface water body (ft)? 100 to 200 feet from Grizzly Gulch; no direct connection to Grizzly Gulch. Tailings are in dry drainage.

Surface water draining onto or through waste sources: Yes____, No X , Describe: Run off only; water from site runs down ditch on opposite side of road from Grizzly Gulch until it dissipates.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetland, irrigation, possible fishery, recreation

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?_________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Few tailings in ditch along Grizzly Gulch road.

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 5 acres

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Limestone in bedrock and float; soils carbonaceous.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000 X ; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1,000 feet from lowest dam face

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Pierson, Tuesday, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	None	Partial/Dry	187,200	149,760	Yes	Moderate
TP-2	None	Partial/Dry	118,800	83,160	Yes	Moderate
TP-3	pH	Partial/Dry	13,500	13,500	Yes	Moderate

Notes and Clarifications: Dust release observed by MDSL personnel; anecdotal evidence.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Site was utilized by three different recreational activities during the investigation. Gun shell casings and off-road vehicle tracks were observed on both tailings; tracks travel up and down the dam faces and are contributing to erosion.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit # W 300' west of the west end of TP-1.

Hazardous structures: Yes___, No_X_, Number____, types and locations: Concrete mill foundation.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_3_, types and locations: Dam faces on TP-1 and TP-2 are steep and eroding. TP-3 very steep and eroding.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, Environmental Assessment Data for Spring Hill Tailings, Prepared by MSE, Inc., October 29, 1990.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Spring Hill Tailings, Prepared by Chen-Northern, April 5, 1989.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Spring Hill Mine, Prepared by Tierra Buena Consulting, December 20, 1982.

MDSL/AMRB Files (Historical Archives), Mining Review of Greater Helena Region, Spring Hill Great Gold Producer, 1934-1935.

USGS, Topographic Map, Helena, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

SPRING HILL TAILINGS
PA NO. 25-067

Spring Hill Tailings PA# 25−067
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − TUESDAY
INVESTIGATION DATE: 08/30/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−067−TP−1A	711	54.2 JX	3.3 J	6.88	13	36.3	38400	0.109 JX	328	10.4 J	97.4 J	6.7 UJ	196	3.1
25−067−TP−1B	485	58 JX	2.5 J	4.88	15.8	24.5	36700	0.064 JX	337	7.11 J	80.2 J	6.81 UJ	182	0.426
25−067−TP−2A	707	55.9 JX	2.2 J	5.81	13.9	59.6	46400	0.118 JX	323	11.9 J	124 J	6.46 UJ	164	7.15
25−067−TP−2B	887	89.7 JX	2.8 J	5.79	15.4	31.7	41100	0.192 JX	410	7.74 J	121 J	6.71 UJ	195	2.63
25−067−TP−3	4800	44 JX	2.1 J	19.1	12.8	334	182000	0.3 JX	152	10 J	1180 J	7.58 UJ	302	758
BACKGROUND	27.1	165 JX	1.3 J	13.6	17.9	29.7	23300	0.070 JX	672	17.9 J	36.3 J	6.98 UJ	76.4	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25−067−TP−1A	1.39	43.4	126	82.8	0.88	0.28	0.23	8.75	117
25−067−TP−1B	1.45	45.3	173	127	0.65	0.24	0.56	7.5	165
25−067−TP−2A	2.02	63.1	111	48	1.24	0.35	0.43	10.9	100
25−067−TP−2B	1.48	46.2	184	138	0.38	0.49	0.61	15.3	168
25−067−TP−3DUP	18	561	−35.	−597	<0.01	9.71	13.9	303	−339
25−067−TP−3	17.9	560	−35.	−595	<0.01	9.78	13.9	306	−341

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25−067−GW−1	14.1 J	2.5	2.57 U	9.7 U	10.6 J	5.1 J	17.2 JX	0.12 U	4.08 U	12.7 U	2.89 J	30.7 U	7.57 U	205
25−067−GW−2	23 J	2.01 U	2.57 U	9.7 U	8.83 J	17.6 J	15.1 JX	0.15	4.08 U	12.7 U	4.9 J	30.7 U	10.4	212
25−067−GW−3	4.42 J	2.01 U	2.57 U	9.7 U	6.83 U	6.8 J	11.8 UX	0.12 U	4.08 U	12.7 U	1.7 J	30.7 U	7.57 U	0.3

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
25−067−GW−1	265	< 5	52	0.31	< 0.005
25−067−GW−2	NR	NR	NR	NR	< 0.005
25−067−GW−3	NR	NR	NR	NR	< 0.005

LEGEND

TP1A − Composite of subsamples TP1A−1, 1A−B, 1B−A, 1C−A, and 1C−B.
TP1B − Composite of subsamples TP1AA−C, 1A−D, 1A−E, 1B−C, 1B−B, and 1C−C.
TP2A − Composite of subsamples TP2A−A, 2A−B, 2A−C, 2B−A, and 2B−B.
TP3 − Composite of subsample TP3A, 3B, and 3C.
BACKGROUND − From the Franklin Mine (25−339−SS−1).
TP3DUP − Duplicate of sample 25−067−TP−3.

GW1 − Spring which supplies residents.
GW2 − Duplicate of sample GW1.
GW3 − QA Blank.

XRF ANALYSIS RESULTS

SPRING HILL TAILINGS
PA NO. 25-067

Mine Name: Spring Hill Tailings PA# 25-067
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-067-TP1A-A		9033.3	76476.8	1392.08	182.667 *	1027.35 *	51605.9			291.071	333.552	322.671
25-067-TP1A-B		10493.6	75086.5	1402.84		978.42 *	33051.2		85.4399 *	199.776	171.812	372.317
25-067-TP1A-C		12544.5	71980	1386.45		657.932 *	28976	326.393 *		139.627	241.608	344.012
25-067-TP1A-D		12408.4	78157.2	1158.6		901.022 *	31006.8			182.135	214.764	313.686
25-067-TP1A-E		13334.7	70768.3	1206.13		498.876 *	34514			165.741	461.97	376.761
25-067-TP1B-A		9119.33	76817.7	1416.13		801.155 *	45928.6	366.336 *	88.2739 *	228.803	604.514	277.717
25-067-TP1B-B		11166.2	82905.1	1465.58	303.288 *	795.372 *	31420.5	439.937 *	61.0211 *	234.512	137.521	293.064
25-067-TP1B-C		8874.38	75539.8	1182.48		641.507 *	30775.7	325.004 *	58.4374 *	194.612	628.872	289.758
25-067-TP1B-C-DUP		10326.5	86226.5	1491.92	187.224 *	805.036 *	32980	484.21 *	83.4336 *	230.057	649.702	303.815
25-067-TP1C-A		10329.8	86169.6	1598.44	186.7 *	872.754 *	52016.4		81.5086 *	227.288	1694.12	300.369
25-067-TP1C-B		15506.9	80090.4	1815.11		861.698 *	29332		43.7117 *	192.857	114.958 *	365.784
25-067-TP1C-C		16445.4	73421.6	1546.35		584.107 *	34089.5	363.385 *		154.35	1113.3	325.214
25-067-TP1-A-COMP		9631.82	74348.2	1262.25	232.523 *	839.282 *	43379		49.4377 *	173.386	799.724	296.205
25-067-TP1-B-COMP		13196.1	89221.3	1543.97		576.967 *	33336.2	341.649 *	82.0219 *	118.574 *	375.045	322.486
25-067-TP2A-A		12188.3	65818.1	1334.5		852.833 *	38674.5			183.687	294.927	331.534
25-067-TP2A-B		8924.74	86634.8	1509.15	189.891 *	723.528 *	38409		43.7598 *	156.738	415.816	331.476
25-067-TP2A-C		7524.12	99508.6	1159.47	203.136 *	738.808 *	43434.6		45.5777 *	199.936	316.195	273.406
25-067-TP2A-D	331.307 *	10693.3	89477	1408.05		528.052 *	34266.5	455.936 *	58.1698 *	124.606 *	222.075	338.4
25-067-TP2B-A		22210.2	48573	1558.29		961.36 *	47848		379.093	184.519	2141.4	423.756
25-067-TP2B-B		12362.9	58201.1	1656.85		610.297 *	53258.6	347.704 *	86.7278 *	137.639 *	978.419	325.052
25-067-TP2B-C		15719.9	61179.5	1851.41		696.409 *	39064.5			133.764 *	1567	392.777
25-067-TP2B-D		9317.38	89504.6	1238.61	261.038 *	611.867 *	28882.9	302.684 *	69.8282 *	221.905	447.696	298.09
25-067-TP2-A-COMP		10485.2	75680.1	1448.15		621.692 *	44907.6		78.3142 *	139.534 *	699.996	296.349
25-067-TP2-B-COMP		12861.6	86765	1817.7		640.573 *	35257.6		82.2895 *	133.174 *	774.673	354.599
25-067-TP3-A		5831.29	13581.5	864.651	147.991 *		135087	805.735 *	218.223 *	147.318 *	3479.14	94.9915
25-067-TP3-B		4470.23	17762.6	759.389	200.1 *	437.938 *	159598	725.016 *	378.085	240.109	2202.19	58.0385
25-067-TP3-C		5548.59	51371	1225.61			117807	1077.45 *	603.092	577.697	4447.03	163.299
25-067-TP-3-COMP	328.919 *	5597.76	27417.1	907.151			141779	769.93 *	432.927	144.726 *	3028.95	114.376

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-067-TP1A-A	124.07		5.25147 *	73.3244 *	70.7816			246.222			
25-067-TP1A-B	117.834		5.06114 *	84.0975	94.1146			306.368			8.02418 *
25-067-TP1A-C	117.455		5.56536 *	44.3403 *	84.5192			388.798			11.4831 *
25-067-TP1A-D	127.787		4.6878 *	42.5929 *	117.684			323.733			6.86369 *
25-067-TP1A-E	124.493		4.83048	43.9202 *	86.8935			378.766			10.1856 *
25-067-TP1B-A	108.417		7.02812 *	96.9559	95.4445			199.55	114.218 *		14.4659 *
25-067-TP1B-B	80.5597			121.913	107.194			243.143	123.252 *		10.3631 *
25-067-TP1B-C	92.8212		6.27218 *	50.1281 *	80.575			304.56	127.59 *		10.5711 *
25-067-TP1B-C-DUP	96.4896		6.84498 *	55.6249 *	88.6681			302.827	104.828 *		9.38441 *
25-067-TP1C-A	98.9033		10.7531 *	146.749	104.607			251.395			20.6626
25-067-TP1C-B	133.385		4.6922 *	105.904	106.905			327.53			8.63266 *
25-067-TP1C-C	106.516		8.9674 *	69.8239	111.853			411.687			12.447 *
25-067-TP1-A-COMP	106.984			107.784	73.0546			256.111	126.92 *		10.9377 *
25-067-TP1-B-COMP	113.554			72.5003	69.5893			337.953			7.22538 *
25-067-TP2A-A	124.72			68.7252	86.9054	164.194 *		189.283	118.195 *		11.3322 *
25-067-TP2A-B	107.577		5.90869 *	64.6998 *	88.4276			287.983	101.294 *		14.2272 *
25-067-TP2A-C	106.557		7.02227 *	76.5039	74.0528			234.577			13.1308 *
25-067-TP2A-D	117.207		4.44416 *	59.2105 *	84.1905			305.235			8.89288 *
25-067-TP2B-A	94.6281		6.92281 *	528.961	110.235			483.451			18.1471 *
25-067-TP2B-B	105.078		4.66675 *	86.255	95.9788			279.316			13.6683 *
25-067-TP2B-C	97.9252		4.49346 *	36.2103 *	100.85			401.643	120.021 *		11.4208 *
25-067-TP2B-D	75.1492			156.919	87.7719			230.797	115.414 *		9.28608 *
25-067-TP2-A-COMP	108.196			117.171	63.6359			263.396			10.5893 *
25-067-TP2-B-COMP	101.355			98.4816	71.6157						
25-067-TP3-A	50.805		35.7718	834.15	192.064	225.863 *		88.7211 *			116.319
25-067-TP3-B	25.5431		56.7449	993.674	165.027	351.337 *		76.0356 *	157.746 *		94.7595
25-067-TP3-C	61.8395		56.8328	1249.08	267.093			94.0902 *	208.771 *		164.941
25-067-TP-3-COMP	42.9569		32.4462	1017.66	154.642	236.702 *		84.214 *	164.067 *		106.329

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SPRING HILL TAILINGS
PA NO. 25-067

AIMSS SCORESHEET

SITE NAME: SPRING HILL TAILINGS
PA NUMBER: 25-067

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	183.892
6	GW - TARGETS	WELLS - 1 MI. x 2.5		130.0
7		WELLS - 1 TO 4 MI		1032
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	1167.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	42920393
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	190.823
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	15
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1144938
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		200
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	350
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.470
29	AIR - TARGETS	POPULATION - 4 MILES		3000
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	3005
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1546073
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.416
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	25
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	8850
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**456.20**

SITE NAME: SPRING HILL TAILINGS
PA NUMBER: 25-067

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	50
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	25
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**25.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Spring Hill Tailings--08/31/90

LAB NO: S2684

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 7.39 SU

Total Metals

As 525 mg/Kg

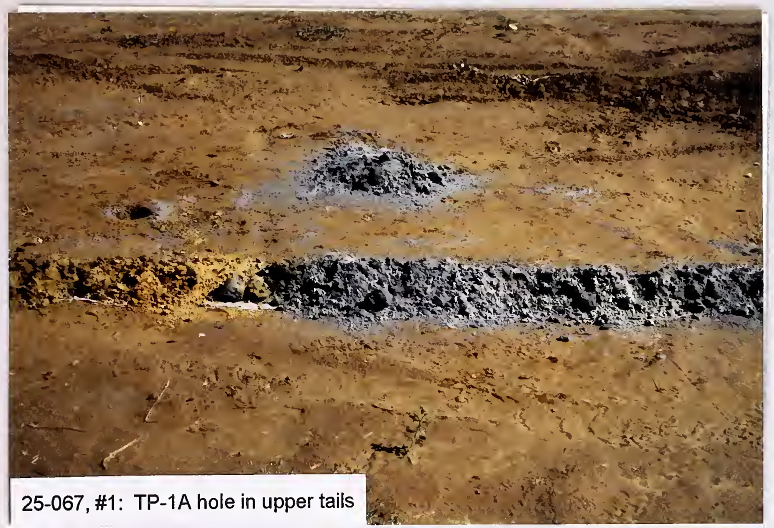
Cd 8 mg/Kg

Cu 14 mg/Kg

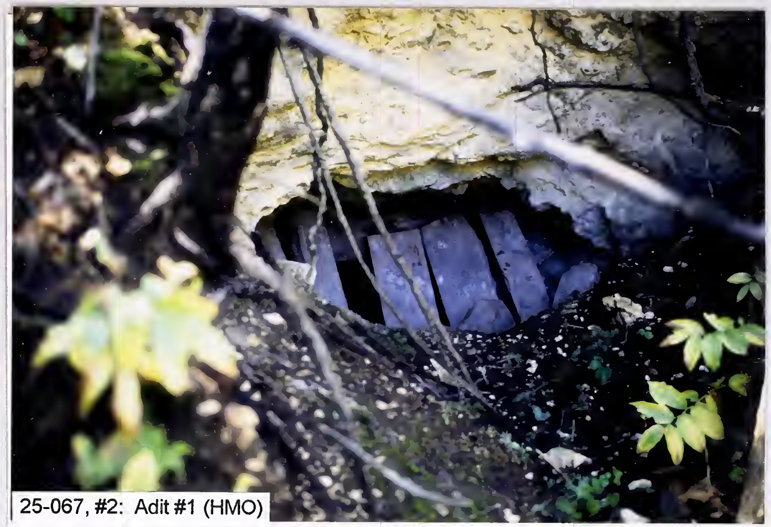
Fe 40,900 mg/Kg

Pb 118 mg/Kg

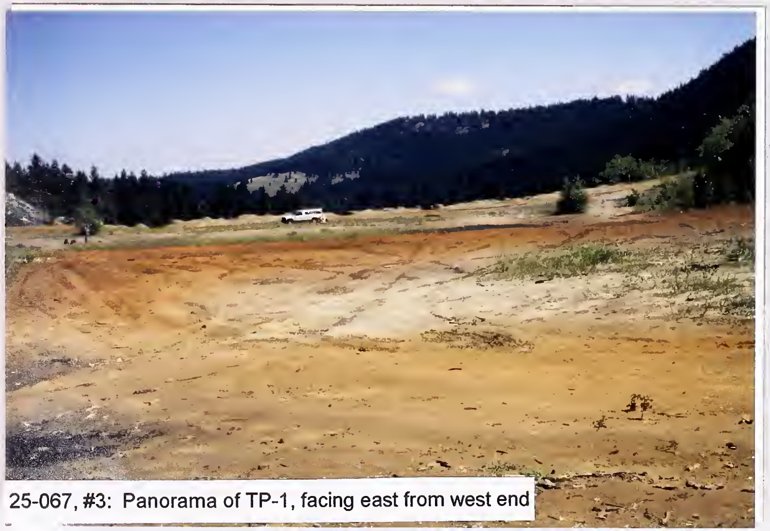
Zn 201 mg/Kg



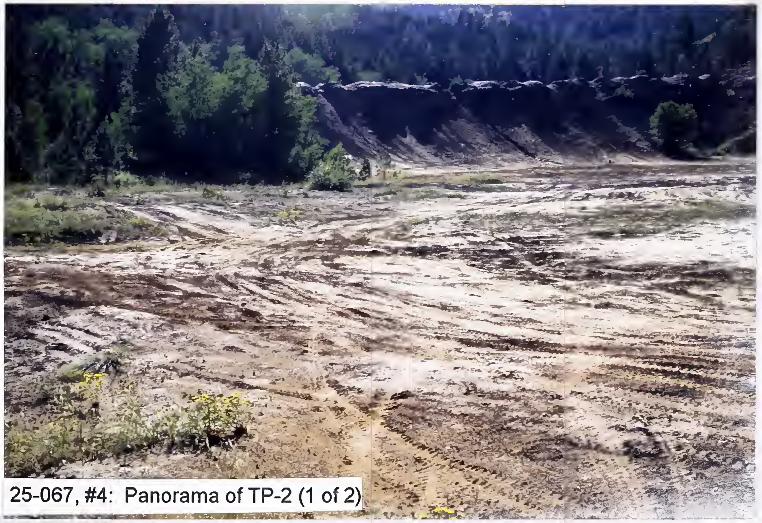
25-067, #1: TP-1A hole in upper tails



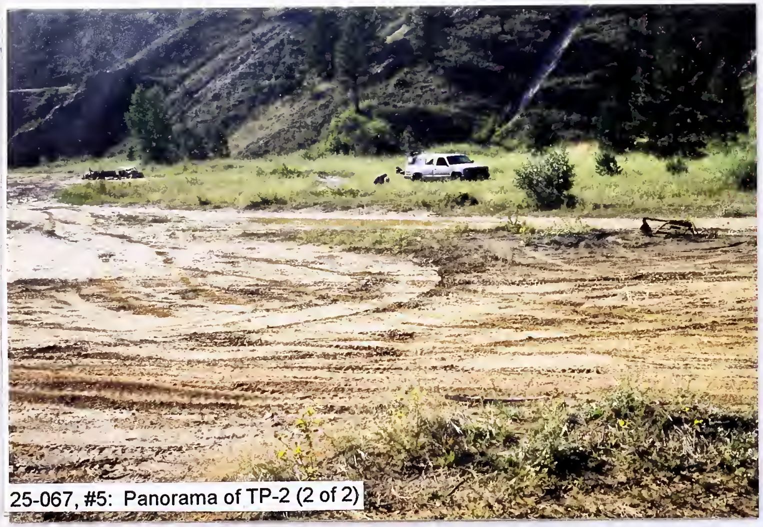
25-067, #2: Adit #1 (HMO)

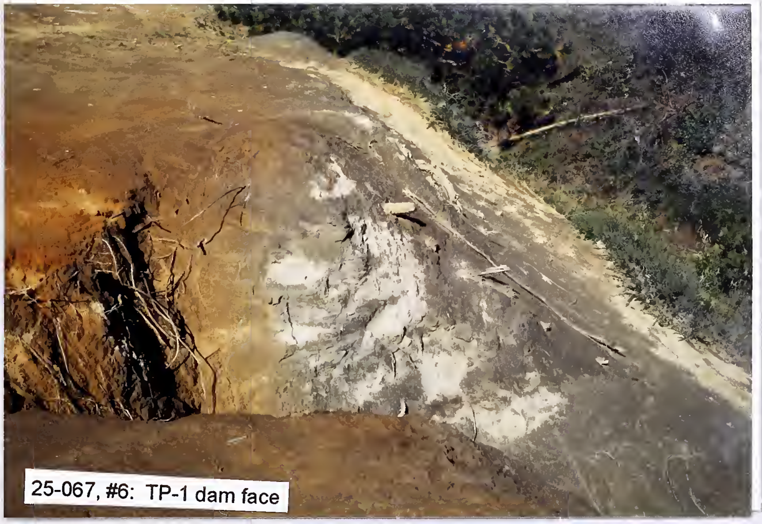


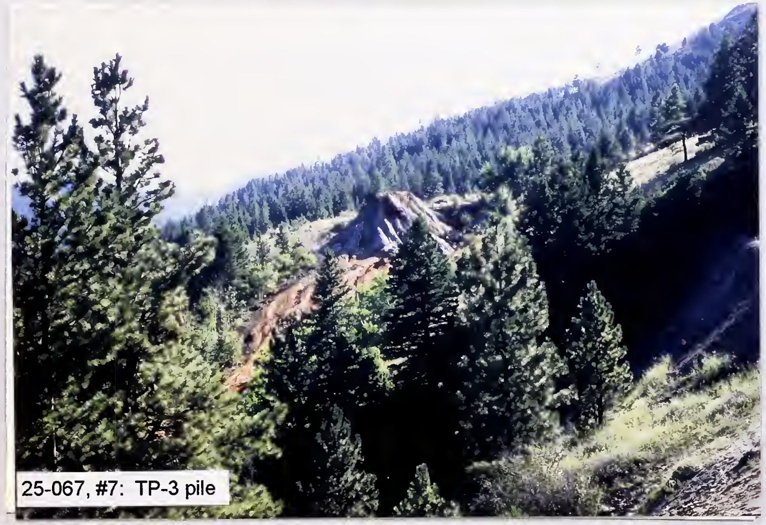
25-067, #3: Panorama of TP-1, facing east from west end

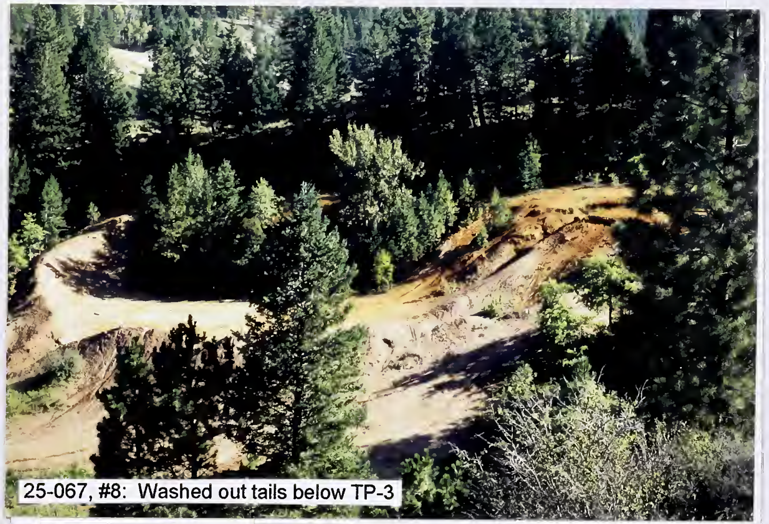


25-067, #4: Panorama of TP-2 (1 of 2)


25-067, #5: Panorama of TP-2 (2 of 2)


25-067, #6: TP-1 dam face


25-067, #7: TP-3 pile


25-067, #8: Washed out tails below TP-3

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LADY LUCK **PA#:** 25-073

Date: August 30, 1993 **Time:** 1830

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Flammang, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Sunny; warm (65°F); calm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #9: HMO that was not identified during the previous inventory. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Access site through the yard of a residence (1764 Orofino Gulch Road).

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close Adit #5.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LADY LUCK PA#: 25-073

Legal Description: T 9N ;R 4W ;Sec. 10 ,NE 1/4 ___1/4 ___1/4
Sec. 11 ,NW 1/4 ___1/4 ___1/4

County: LEWIS AND CLARK Mining District: HELENA

Latitude: N 46° 33' 06" Longitude: W 112° 04' 55"

Primary Drainage Basin and Code: Ten Mile Creek/10030101
Secondary Drainage Basin: Orofino Creek

USGS Quadrangle map name(s): Helena

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Barbara Hamilton, 1110 Hollins, Helena, MT 59601. (406) 378-2546; Curtis Hansen, Box 159, Big Sandy, MT 59520. (406) 378-2546.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Four culvert closures on adits; one grate on caved adit, possibly MDSL; no permit known.

General site features: Elevation 5000'-5240' , Slope 10° ,
Aspect North

Land use: Mining___, Recreational X , Residential X , Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 3.44 acres.
Dimensions: Lower, 500'x100'; upper, 500'x200'

Predominant vegetation types: Ponderosa pine, firs

Access: roads - good___,poor___,4wd X ,trail X; WR-3.
Other logistical considerations (proximity to other sites). Near Davis Gulch #3 and Spring Hill Tailings.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 97 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). No water present on site; however, water leaving the site would flow east and northeast and eventually would flow into Orofino Creek, which flows northeast away from the site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes___, No X, # ____, Comment
Adits - Yes X, No___, # 5, Comment 1 open; 4 culvert-closed
Pits - Yes___, No X, # ____, Comment
Placers - Yes___, No X, # ____, Comment
Other - Yes X, No___, # 1, Comment Caved adit; grated

Mill Operation? Yes____, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

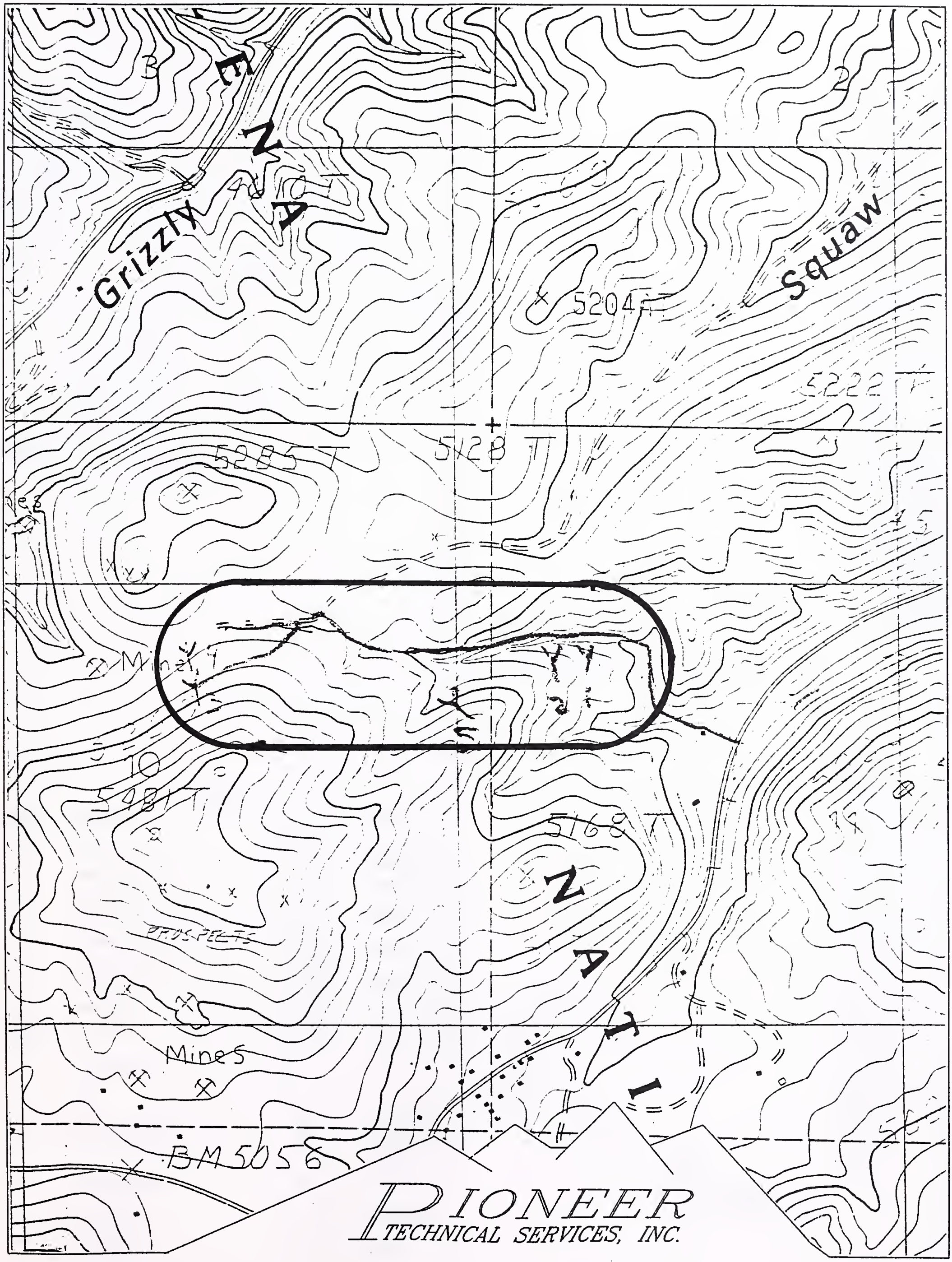
l No.	Location	Depth	Yield	Static Water Level
M:127879	09N 04W 01 BC	200.0	15.0	25.00
M:58900	09N 04W 02	145.0	30.0	65.00
M:58899	09N 04W 02	208.0	6.0	25.00
M:128024	09N 04W 02 DD	310.0	15.0	100.00
M:58901	09N 04W 03	90.0	7.0	33.00
M:58902	09N 04W 03 CD	79.0	20.0	30.00
M:58908	09N 04W 10	46.0	30.0	0.00
M:58911	09N 04W 10	50.0	0.0	0.00
M:58906	09N 04W 10	95.0	12.0	79.00
M:58912	09N 04W 10	40.0	30.0	0.00
M:58909	09N 04W 10	38.0	8.0	0.00
M:58910	09N 04W 10	80.0	10.0	15.00
M:58907	09N 04W 10	44.0	10.0	22.00
M:130188	09N 04W 10 CC	305.0	20.0	180.00
M:58913	09N 04W 10 CCB	105.0	30.0	16.00
M:58915	09N 04W 10 D	43.0	8.0	17.00
M:58914	09N 04W 10 D	38.0	8.0	0.00
M:131264	09N 04W 10 DAD	101.0	12.0	34.00
M:58916	09N 04W 10 DD	140.0	15.0	40.00
M:58917	09N 04W 11	187.0	10.0	28.00
M:58923	09N 04W 11	124.0	10.0	64.00
M:58921	09N 04W 11	88.0	9.0	50.00
M:58919	09N 04W 11	35.0	12.0	27.00
58920	09N 04W 11	0.0	0.0	0.00
58922	09N 04W 11	146.0	9.0	20.00
58918	09N 04W 11	64.0	0.0	20.00
M:58924	09N 04W 11 AA	0.0	0.0	30.00
M:58925	09N 04W 11 C	105.0	5.0	25.00
M:58926	09N 04W 11 CC	46.0	20.0	12.00
M:5496	09N 04W 11 CCC	0.0	0.0	0.00
M:58927	09N 04W 11 CCC	30.0	10.0	15.00
M:58929	09N 04W 11 CCC	30.0	10.0	10.00
M:58928	09N 04W 11 CCC	30.0	10.0	10.00
M:5495	09N 04W 11 CCC	0.0	0.0	0.00
M:58930	09N 04W 11 CCD	98.0	15.0	30.00
M:58932	09N 04W 11 D	160.0	20.0	40.00
M:58931	09N 04W 11 D	185.0	9.0	71.00
M:58933	09N 04W 11 DA	185.0	6.0	38.00
M:58934	09N 04W 11 DC	180.0	6.0	48.00
M:58935	09N 04W 11 DCA	148.0	15.0	16.00
M:58936	09N 04W 11 DD	249.0	25.0	53.00
M:58938	09N 04W 12	95.0	20.0	7.00
M:58937	09N 04W 12	102.0	10.0	15.00
M:58939	09N 04W 12	115.0	10.0	57.00
M:58941	09N 04W 12	56.0	30.0	12.00
M:58942	09N 04W 12 BA	45.0	10.0	6.00
M:120004	09N 04W 12 BAA	200.0	10.0	28.00
M:58943	09N 04W 12 BC	240.0	30.0	100.00
M:58944	09N 04W 12 BDD	80.0	20.0	18.00
:58945	09N 04W 12 C	124.0	8.0	25.00
58947	09N 04W 12 CB	85.0	4.0	15.00
M:58946	09N 04W 12 CB	140.0	8.0	20.00
M:58948	09N 04W 12 CC	336.0	15.0	77.00
M:58949	09N 04W 12 CCCC	30.0	5.0	15.00
M:58950	09N 04W 12 D	87.0	12.0	37.00

M:58940	09N 04W 12 DA	125.0	20.0	13.00
M:62325	09N 04W 12 DB	135.0	50.0	15.00
M:121011	09N 04W 12 DC	148.0	20.0	20.00

Montana Bureau of Mines and Geology
Water Well Log Data

11/12/1993

l No.	Location	Depth	Yield	Static Water Level
M:58951	09N 04W 12 DDB	259.0	6.0	28.00
M:58952	09N 04W 13 A	250.0	3.0	31.00
M:122660	09N 04W 13 BBB	202.0	15.0	90.00
M:58953	09N 04W 13 BBBB	30.0	5.0	15.00
M:58954	09N 04W 14	62.0	0.0	27.00
M:58955	09N 04W 14 A	105.0	10.0	32.00
M:58956	09N 04W 14 AAAA	75.0	5.0	25.00
M:58958	09N 04W 14 B	35.0	0.0	0.00
M:58957	09N 04W 14 B	0.0	0.0	60.00
M:122358	09N 04W 14 DAA	80.0	3.0	27.00
M:58959	09N 04W 15	50.0	4.0	27.00
M:58962	09N 04W 15	340.0	8.0	75.00
M:58961	09N 04W 15	207.0	15.0	70.00
M:58963	09N 04W 15	36.0	10.0	16.00
M:58964	09N 04W 15	230.0	0.0	60.00
M:58960	09N 04W 15	25.0	0.0	0.00
M:58966	09N 04W 15 A	71.0	3.0	30.00
M:58965	09N 04W 15 A	45.0	5.0	30.00
M:58967	09N 04W 15 A	80.0	6.0	30.00
M:58970	09N 04W 15 AA	187.0	12.0	30.00
M:58969	09N 04W 15 AA	32.0	30.0	20.00
M:58971	09N 04W 15 AA	180.0	16.0	52.00
M:120412	09N 04W 15 AA	320.0	8.0	40.00
58968	09N 04W 15 AA	47.0	0.0	24.00
58972	09N 04W 15 AAA	29.0	25.0	22.00
58973	09N 04W 15 AAAB	14.0	5.0	0.00
M:58974	09N 04W 15 AAAB	38.0	10.0	0.00
M:5497	09N 04W 15 AAC	48.0	0.0	0.00
M:58975	09N 04W 15 AADB	32.0	5.0	0.00
M:58976	09N 04W 15 AADB	32.0	4.0	0.00
M:58977	09N 04W 15 AB	140.0	5.0	30.00
M:58978	09N 04W 15 AC	255.0	18.0	63.00
M:58979	09N 04W 15 AD	78.0	6.0	55.00
M:58980	09N 04W 15 BA	139.0	2.0	60.00
M:58981	09N 04W 15 BB	19.0	10.0	1.00
M:58982	09N 04W 15 BC	305.0	14.0	55.00
M:58983	09N 04W 15 C	142.0	0.0	85.00
M:58984	09N 04W 15 DD	36.0	10.0	16.00
M:58985	09N 04W 15 DD	29.0	25.0	16.00

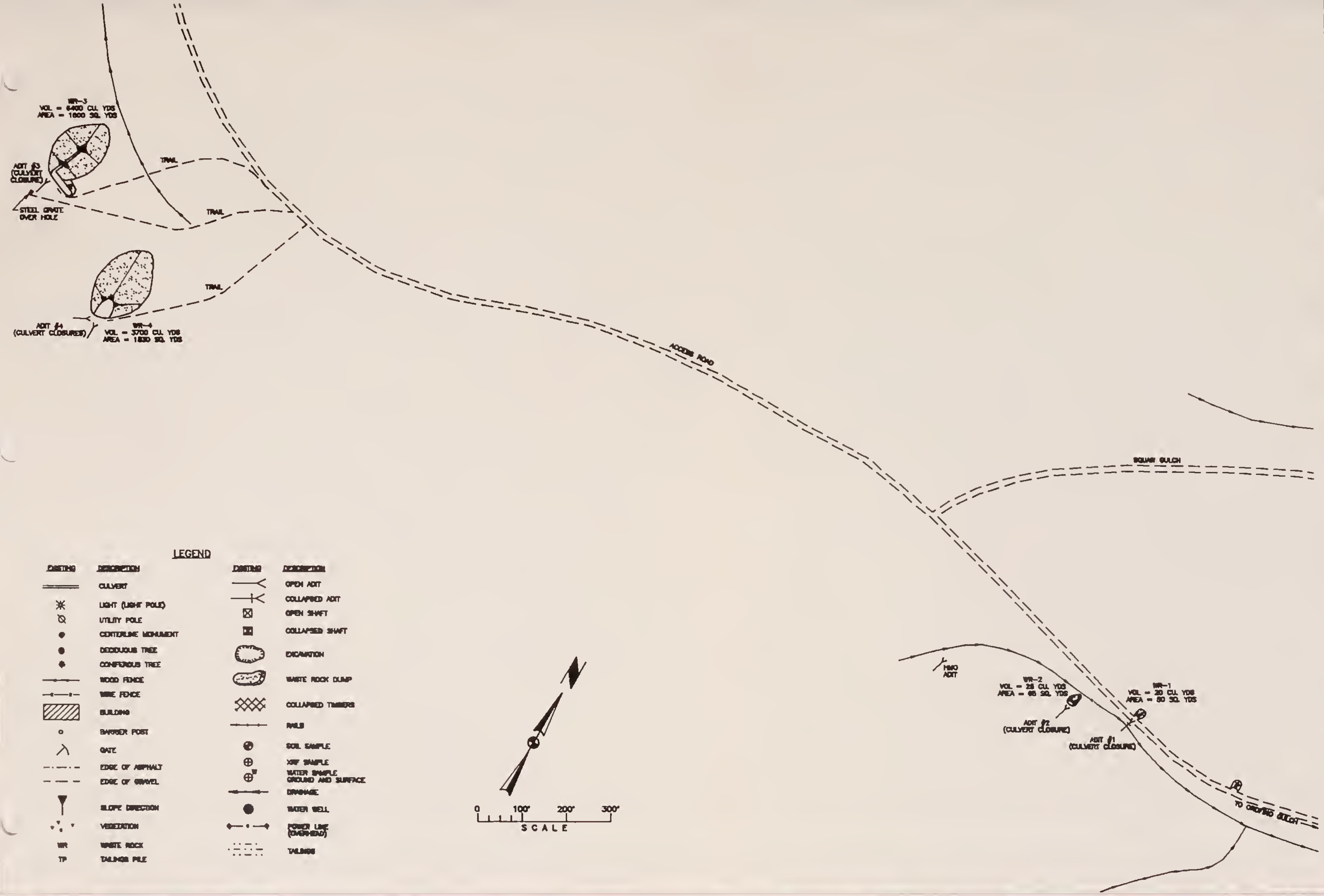


PIONEER
TECHNICAL SERVICES, INC.

LADY LUCK, P.A. NO. 25-073

T09N, R04W, SECTION 11

SCALE: 1" = 1000'



DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
LADY LUCK PA# 25-073
HELENA DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-073.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-3	WR	6,400	In center of dump, 10' from top	None	6.20 (D)	0.02	25-073-WR-1	09/01/93 1655	T-Metals, ABA
WR-4	WR	3,700	Center of dump, 5' from top	None	6.80 (D)	0.02			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: No samples taken at other dumps; most were < 25 yd3 and well vegetated. 25-073-WR-1 is composite of WR-3 and -4.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:________

Filled shafts: Yes___, No X , Number:____ Identification:________

Seeps/Springs: Yes___, No X , Number:____ Identification:________

Groundwater wells within 4 miles?: Yes X , No___,
Number of well logs: 853

Distance to nearest well used for drinking? Approx. 1 mile from WR-4; 0.5 mile from Adit #1

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
No water seen on-site; metal values in dumps are low.

Other observations/notes:________

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s): N/A

Dry gulches: Yes X , No___, Name(s): Unnamed; Adit #5 lies in a dry drainage.

Other surface water: Yes____, No X , Name(s)/Description: N/A

Waste materials within any floodplain: Yes____, No X Source ID(s): N/A

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 0.5 mile to Grizzly Gulch, 0.25 mile to Orofino Gulch

Surface water draining onto or through waste sources: Yes____, No X ,
Describe: Runoff only

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Recreational, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)? N/A Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Moderately steep and heavily forested; no area for treatment.

Wetlands present: Yes___, No X, Describe: N/A

Carbonate rocks/soils: Yes X, No___, Describe: Limestone present in float throughout hillside and on WR-3 and -4.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater X; Comments___

Nearest residence(ft or miles)? Approx. 1 mile from WR-4; 0.5 mile from Adit #1.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-3	None	Dry	14,400	7,200	Yes	Low
WR-4	None	Dry	16,470	4,941	Yes	Low

Notes and Clarifications: Large trees are growing on WR-3.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ;
Describe: N/A

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300 X ;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments

Evidence of recreational use on site: Yes___, No X , Describe: N/A

Accessibility - Fences, warning signs, closed roads? Drive through residence yard; locked gate on Squaw Gulch; 4 culvert closures; 1 grate

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment
Wilderness Area - Yes___, No X , Comment
T&E Species Habitat - Yes___, No X , Comment
Bat Habitat - Yes___, No X , Comment

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations:
Adit #5 is open.

Hazardous structures: Yes___, No X , Number____, types and locations:

Unstable highwalls, pits, trenches, slopes: Yes____, No X , Number____,
types and locations:

Unstable waste piles, impoundments, undercut banks: Yes____, No X ,
Number____, types and locations:

Fire and/or Explosion hazards: Yes___, No X , Explain:

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for the Lady Luck site, Prepared by Daphne Digrindakis, October 24, 1986.

USGS, Topographic Map, Helena, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

LADY LUCK
PA NO. 25-073

MDSL AMRB/PIONEER 4/9/93

Lady Luck PA# 25-073
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 08/30/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-073-WR-1	18.8 J	0.244 U	1 U	1.11 U	6.72 J	13.3 JX	4590	0.456 JX	200	6.24 J	7.28 U	7.03 UJ	76.6 J	NR
BACKGROUND	27.1	165 JX	1.3 J	13.6	17.9	29.7	23300	0.070 JX	672	17.9 J	36.3 J	6.98 UJ	76.4	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-073-WR-1	<0.01	0	852	852	<0.01	<0.01	0.01	0	852

LEGEND

WR1 - Composite of subsamples WR3 and 4.
BACKGROUND - From the Franklin Mine (25-339-SS-1).

XRF ANALYSIS RESULTS

LADY LUCK
PA NO. 25-073

Mine Name: Lady Luck PA# 25-073
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-073-WR-1-COMP	369 $		181960 $	361 $		103 $	12825 $			191 $	61 $	91 $
25-073-WR-3		3615.39	140248	1338.94	260.301 *	765.745 *	25346.9		169.973 *	165.541		145.93
25-073-WR-4			163784	144.89 *		369.721 *	9449.33		50.6086 *	136.341	37.8424 *	92.2708

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-073-WR-1-COMP	22 $		3 $	10 $	15 $		27 $	7 $	62 $		
25-073-WR-3	37.3189		4.05406 *	43.5216 *	33.0243 *	189.451 *		54.2338 *	105.356 *		5.63717 *
25-073-WR-4	15.8742		5.20689 *	18.6031 *	19.3265 *						5.57028 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LADY LUCK
PA NO. 25-073

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

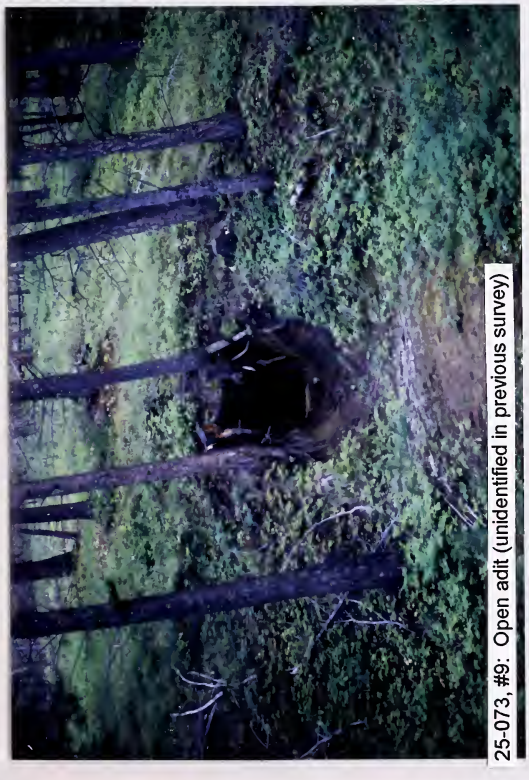
SITE NAME: LADY LUCK
PA NUMBER: 25-073

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.004
6	GW - TARGETS	WELLS - 1 MI. x 2.5		242.5
7		WELLS - 1 TO 4 MI		756
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	998.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	160
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.008
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	15
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	24
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29	AIR - TARGETS	POPULATION - 4 MILES		10000
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	10000
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	50
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		100
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	100
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.00**

SITE NAME: LADY LUCK
PA NUMBER: 25-073

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	50
9		POPULATION - 1 MILE		100
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	100
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**50.00**



25-073, #9: Open adit (unidentified in previous survey)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MOTHER LODE PA#: 25-363

Date: August 31, 1993 Time: 0800-0930

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Flammang, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Cool; clear.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): No photos were taken. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is a silver film reprocessing facility and not a mining site; silver reclaimed from spent film with CN-. A fire in 1984 caused release of CN- resulting in contaminated soils and groundwater. The soils were removed by EPA and monitoring wells were installed; EPA capped the site with clay and one well showed CN-. No samples were collected - CERCLIS site industrial. Two monitoring wells were located; others are subsurface.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Site should be removed from inventory.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MOTHER LODE **PA#:** 25-363

Legal Description: T 10N ;R 3W ;Sec. 23 , NE1/4 NE1/4 ___1/4

County: LEWIS & CLARK **Mining District:** HELENA

Latitude: N 46° 37' 00" **Longitude:** W 111° 55' 15"

Primary Drainage Basin and Code: Prickly Pear Creek/10030101
Secondary Drainage Basin: Prickly Pear Creek

USGS Quadrangle map name(s): East Helena

Mine Type/Commodities: None

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Stan Peterson, Helena, MT 59601; Helena National Forest.

Relationship to other mines/sites in the area/district: None

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? CERCLIS site; remediated by EPA/ERT contractor. The site is currently listed under the CECRA Program.

General site features: Elevation 3790' , Slope Flat ,
Aspect______

Land use: Mining___, Recreational___, Residential X , Urban___,
Agricultural___, Other(Specify) Industrial

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions:______

Predominant vegetation types: Weeds

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).______

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 4 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by Tertiary gravels of the Helena Valley.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes___, No X , # _____, Comment
Adits - Yes___, No X , # _____, Comment
Pits - Yes___, No X , # _____, Comment
Placers - Yes___, No X , # _____, Comment
Other - Yes___, No X , # _____, Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Helena : Winston : Alhambra

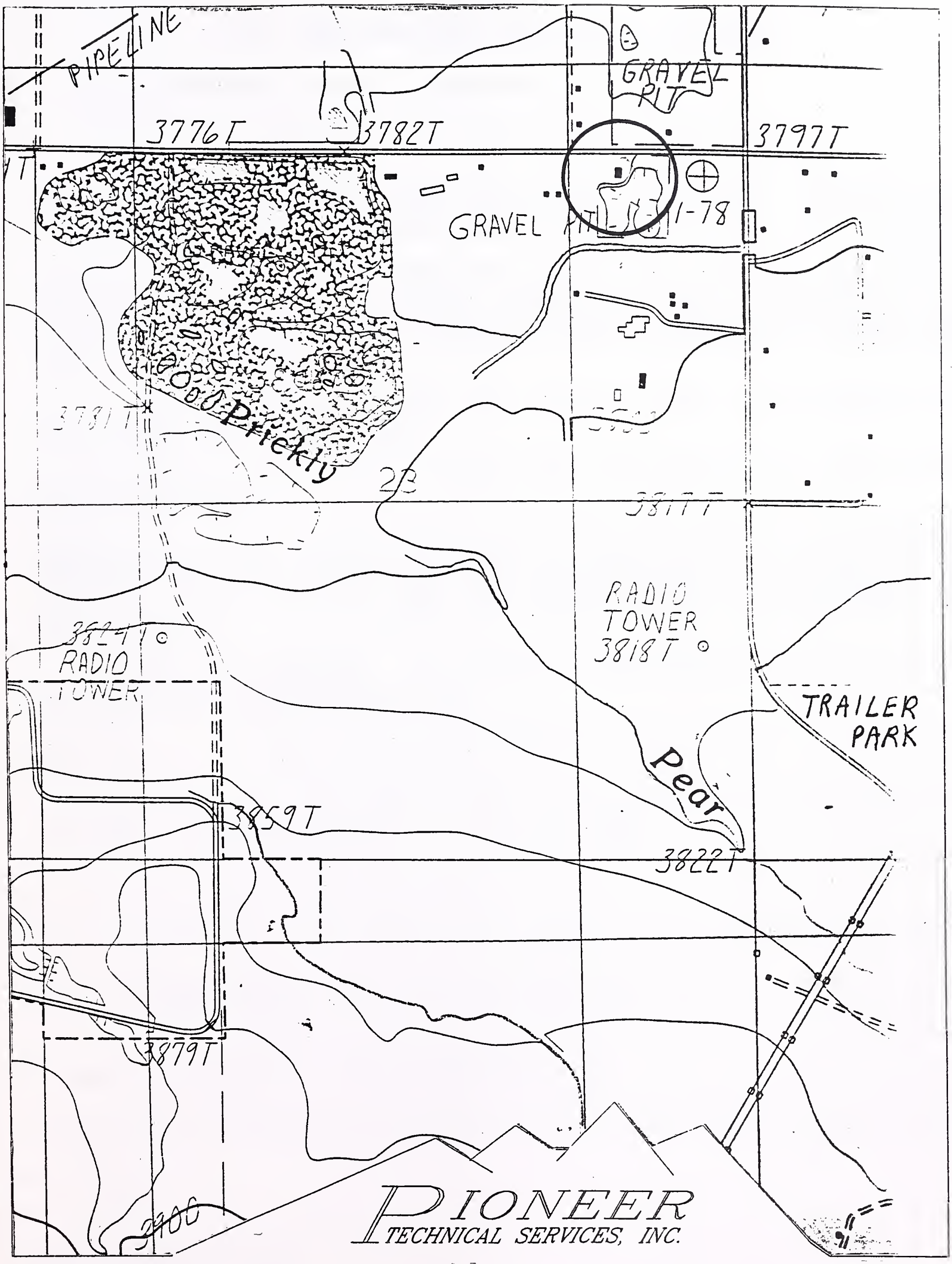
Montana Bureau of Mines and Geology
Water Well Log Data
06/10/1993

→Well No.: M:58500
Location: 09N 02W 13 BC
Site Name: MONTANA CITY SCHOOL
County: Jefferson
Depth: 150.0
Yield: 75.0
Static Water Level: 28.00
Pumping Water Level: 0.0
Year drilled: 1988
Driller:
Driller's License: 334
DNRC Well No.:

→Well No.: M:58560
Location: 09N 02W 24
Site Name: PEDERSON DONALD
County: Jefferson
Depth: 167.0
Yield: 25.0
Static Water Level: 90.00
Pumping Water Level: 160.0
Year drilled: 1975
Driller:
Driller's License: 038
DNRC Well No.:

→Well No.: M:58561
Location: 09N 02W 24
Site Name: ARMSTRONG DAVE
County: Jefferson
Depth: 208.0
Yield: 4.0
Static Water Level: 40.00
Pumping Water Level: 200.0
Year drilled: 1977
Driller:
Driller's License: 253
DNRC Well No.:

→Well No.: M:58562
Location: 09N 02W 25 CA
Site Name: HOHN JIM
County: Jefferson
Depth: 34.0
Yield: 8.0
Static Water Level: 20.00
Pumping Water Level: 29.0
Year drilled: 1967
Driller:
Driller's License: 38
DNRC Well No.:



MOTHER LODE, P.A. NO. 25-363

T09N, R02W, SECTION 23

SCALE: 1″ = 1000′

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: ____________________

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.									

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: ____________________

____

____

____

MDSL AMRB/PIONEER 4/9/93

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 5 miles?: Yes_X_, No___;
Number of well logs: 973

Distance to nearest well used for drinking? 1/4 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
CN- spill; no groundwater remediation, only a source cleanup.

Other observations/notes: Not a mining site.

GROUNDWATER INVENTORY FORM

SAMPLERS: ____

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC μS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
3,000 feet

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
N/A

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 acres

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000_X_; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS:____________________

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
No samples were taken.						

Notes and Clarifications:____________________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____,
Describe: Workers across the street at a gravel pit.

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000_X_; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes_X_, No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

USGS, Topographic Map, East Helena, Montana, 7 1/2 minute Quadrangle, 1985.

Weston-Sper, Removal Action Report for Mother Lode, Submitted to the Environmental Protection Agency, November 16, 1984.

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MOTHER LODE
PA NO. 25-363

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: MOTHER LODE
PA NUMBER: 25-363

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD	CONTAINMENT		20
3B	OF RELEASE	GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
6		WELLS - 1 MI. x 2.5		10.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		969
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	984.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD	EXCEEDENCES		0
13A	OF RELEASE	CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD	CONTAINMENT		1
26B	OF RELEASE	DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29		POPULATION - 4 MILES		3000
30		NEAREST RESIDENCE		5
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	3010
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF	ACCESSIBILITY		20
37B	EXPOSURE	DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT	POPULATION - 1 MILE		1000
41	TARGETS	NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	1005
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.00**

SITE NAME: MOTHER LODE
PA NUMBER: 25-363

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		1000
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1005
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

MDSL AMRB/PIONEER 4/9/93

ENERGY LABORATORIES

ENERGY LABORATORIES, INC.
P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325

LABORATORY REPORT

Lab. No. 84-5908

To Riedel International Date 10-22-84 sam

Address P.O. Box 3320 Portland, Oregon 97208-3320

SOIL ANALYSIS

Motherlode Project - Helena, Montana
Samples Received 10-13-84 and 10-14-84

SAMPLE NUMBER	DATE SAMPLED	TIME SAMPLED	LOCATION SAMPLED	CYANIDE,* ug/g as rec'd	MOISTURE, % as rec'd
1	10/12/84	1310	A1-GD	1.46	3.00
2	10/12/84	1315	B1-GD	6.30	6.50
3	10/12/84	1325	C1-GD	2.79	6.52
4	10/12/84	1322	D1-GD	78.0	8.96
5	10/12/84	1325	E1-GD	141	4.45
6	10/12/84	1325	F1-GD	201	7.07
7	10/12/84	1335	G1-GD	187	8.13
8	10/12/84	1340	B2-GD	10.0	3.54
9	10/12/84	1345	C2-GD	0.65	1.40
10	10/12/84	1345	D2-GD	0.90	1.80
11	10/12/84	1350	E2-GD	3.77	3.30
12	10/12/84	1352	F2-GD	15.7	3.78
13	10/12/84	1455	LFC	13.2	1.68
14	10/12/84	1500	SFC	11.2	0.21
15	10/12/84	1509	R#1-GD	0.41	2.73
17	10/12/84	1425	H2-GD	0.27	1.55
18	10/12/84	1425	I1-GD	11.2	2.81
19	10/12/84	1428	I2-GD	0.13	0.79
20	10/12/84	1433	H3-GD	1.47	2.16
21	10/12/84	1355	G2-GD	1.05	1.50
22	10/12/84	----	F3-GD	0.13	0.32
23	10/12/84	1410	G3-GD	0.95	2.09
24	10/12/84	1415	H1-GD	0.38	3.27
25	10/12/84	1614	I1-1FT	33.0	7.09
26	10/12/84	1619	H2-1FT	0.13	2.22
27	10/12/84	1618	I2-1FT	0.14	1.60
28	10/12/84	1622	G2-1FT	2.74	2.71

*Cyanide was extracted into 2% sodium hydroxide. The resulting solution was tested. Results are expressed as ug cyanide per gram of soil.

[illegible]
[illegible]
[illegible]
[illegible]

SAMPLE NUMBER	DATE SAMPLED	TIME SAMPLED	LOCATION SAMPLED	CYANIDE,* ug/g as rec'd	MOISTURE, % as rec'd
29	10/12/84	1605	E1-1FT	138	6.08
30	10/12/84	1607	F1-1FT	213	6.22
31	10/12/84	1610	G1-1FT	102	9.06
32	10/12/84	1612	H1-1FT	4.49	4.32
33	10/12/84	1530	R3-GD	180	8.00
34	10/12/84	1559	B1-1FT	1.15	5.04
35	10/12/84	1600	C1-1FT	0.67	3.92
36	10/12/84	1602	D1-1FT	288	11.2
37	10/12/84	1628	C2-1FT	6.67	3.06
38	10/12/84	1626	D2-1FT	0.38	1.78
39	10/12/84	1625	E2-1FT	2.68	3.33
40	10/12/84	1623	F2-1FT	5.77	3.25
41	10/12/84	1637	H3-1FT	0.41	3.24
42	10/12/84	1633	F3-1FT	0.09	2.79
43	10/12/84	1634	G3-1FT	0.22	2.42
44	10/12/84	1629	B2-1FT	7.29	4.67
45	10/12/84	1700	R3-1FT	108	12.9
46	10/12/84	1637	XYZ-5	11.5	2.69
47	10/12/84	1722	LFP-5	17.2	2.74
48	10/12/84	1425	XYZ-4	6.17	1.53
49	10/12/84	1712	LFP-4	7.09	1.45
50	10/12/84	1714	LFP-3	2.12	2.02
51	10/12/84	1716	LFP-2	0.14	0.57
52	10/12/84	1720	XYZ-1	1.58	5.44
53	10/12/84	1710	LFP-8	1.85	6.92
54	10/12/84	1708	LFP-7	0.63	5.07
55	10/12/84	1706	LFP-6	0.23	2.56
56	10/12/84	1300	XYZ-3	1.28	1.46
57	10/12/84	1412	XYZ-2	0.12	0.62
58	10/12/84	1702	LFP-1	1.85	6.71
59	10/12/84	1518	GDR-#2	0.74	1.53
60	10/12/84	Field Blank	LFP-9	0.11	2.04
61	10/13/84	1920	Z3-1FT	1.26	9.38
62	10/13/84	1547	M7-1FT	0.05	6.06
63	10/13/84	1557	M8-1FT	0.13	3.35
64	10/13/84	1752	G2-2FT	1.84	3.41
65	10/13/84	1742	D2-2FT	0.07	2.71
66	10/13/84	1738	C2-2FT	15.0	2.87
67	10/13/84	1145	B1-2FT	0.31	3.06
68	10/13/84	1758	E2-2FT	0.11	1.40
69	10/13/84	1745	E1-2FT	0.83	2.54
70	10/13/84	1735	B2-2FT	0.27	2.31
71	10/13/84	1150	C1-2FT	0.23	2.73
72	10/13/84	1800	H2-2FT	0.07	2.51
73	10/13/84	1750	F2-2FT	2.41	2.95
74	10/13/84	1224	G1-2FT	25.5	4.60
75	10/13/84	1158	D1-2FT	16.2	6.47

*Cyanide was extracted into 1N sodium hydroxide. The resulting solution was tested. Results are expressed as ug cyanide per gram of soil.

SAMPLE NUMBER	DATE SAMPLED	TIME SAMPLED	LOCATION SAMPLED	CYANIDE,* ug/g as rec'd	MOISTURE, % as rec'd
76	10/13/84	1823	M5-2FT	0.07	3.40
77	10/13/84	1819	M3-2FT	0.07	3.34
78	10/13/84	1817	M2-2FT	0.11	6.36
79	10/13/84	1808	G3-2FT	0.09	2.74
80	10/13/84	1824	M6-2FT	0.07	2.92
81	10/13/84	1821	M4-2FT	1.01	5.55
82	10/13/84	1810	H3-2FT	0.20	2.16
83	10/13/84	1805	F3-2FT	0.07	2.27
84	10/13/84	1615	R2-2FT	0.70	6.50
85	10/13/84	1617	R1-2FT	1.03	3.62
86	10/13/84	1720	LPC-1	32.4	8.96
87	10/13/84	1728	LPC-2	10.5	5.41
88	10/13/84	1827	M7-2FT	0.11	3.71
89	10/13/84	1845	LFP6-2FT	0.36	4.97
90	10/13/84	1853	LFP2-2FT	3.71	3.65
91	10/13/84	1555	M5-1FT	0.11	2.70
92	10/13/84	1549	M4-1FT	1.03	5.96
93	10/13/84	1815	M1-2FT	0.09	5.68
94	10/13/84	1559	M3-1FT	0.05	5.19
95	10/13/84	1553	M2-1FT	0.07	10.4
96	10/13/84	1551	M1-1FT	0.14	6.43
97	10/13/84	1838	XYZM2-2FT	0.14	5.39
98	10/13/84	1851	LFP5-2FT	77.7	5.45
99	10/13/84	1859	LFP4-2FT	65.7	6.27
100	10/13/84	1840	XYZM8-2FT	0.34	2.60
101	10/13/84	1849	LFP3-2FT	8.40	5.02
102	10/13/84	1857	XYZLFP7-2FT	1.10	7.72
103	10/13/84	1830	M8-2FT	0.14	2.94
104	10/13/84	1847	LFP7-2FT	1.24	7.94
105	10/13/84	1855	XYZLFP6-2FT	0.41	5.01
106	10/13/84	1215	F1-2FT	32.4	4.15
107	10/13/84	1205	E1-2FT	130	3.72
108	10/13/84	1657	LFP5-1FT	43.5	5.81
109	10/13/84	1654	LFP1-1FT	1.73	6.40
110	10/13/84	1651	LFP2-1FT	6.00	8.61
111	10/13/84	1648	LFP3-1FT	0.23	4.81
112	10/13/84	1703	LFP7-1FT	21.0	7.80
113	10/13/84	1700	LFP6-1FT	0.25	5.40
114	10/13/84	1605	R1-1FT	1.53	4.37
115	10/13/84	1607	R2-1FT	0.34	5.07
116	10/13/84	1645	LFP4-1FT	30.6	5.81
117	10/13/84	1706	LFP8-1FT	3.76	8.48
118	10/13/84	1136	M7-GD	0.34	8.85
119	10/13/84	1130	M6-GD	0.25	6.50
120	10/13/84	1124	M3-GD	0.13	7.46
121	10/13/84	1044	Z3-GD	3.60	5.22
122	10/13/84	1133	M8-GD	0.70	6.46
123	10/13/84	1127	M5-GD	0.16	6.11
124	10/13/84	1121	M2-GD	0.25	15.1
125	10/13/84	1041	Z2-1FT	0.41	9.14

*Cyanide was extracted into 1N sodium hydroxide. The resulting solution was tested. Results are expressed as ug cyanide per gram of soil.

SAMPLE NUMBER	DATE SAMPLED	TIME SAMPLED	LOCATION SAMPLED	CYANIDE,* ug/g as rec'd	MOISTURE, % as rec'd
126	10/13/84	1545	M8-1FT	0.20	2.67
127	10/13/84	1118	M4-Gd	1.53	5.75
128	10/13/84	1115	M1-GD	0.76	8.81
129	10/13/84	1040	Z1-2FT	1.44	3.51
130	10/13/84	1910	NYZ12-2FT	0.13	1.89
131	10/13/84	1906	NYZH2-1FT	0.11	2.25
132	10/13/84	1903	R3-1FT	112	13.1
133	10/13/84	1901	LFP1-2FT	2.50	6.98
134	10/13/84	1913	Field Blank	1.15	3.05
135	10/13/84	1915	Z1-3FT	1.96	2.72
136	10/18/84	AM	AA1-GD	0.05	5.33
137	10/18/84	AM	AA2-GD	0.10	7.27
138	10/18/84	AM	AA3-GD	0.08	8.40
139	10/18/84	AM	AA3-GDD	0.10	8.54
140	10/18/84	AM	AA4-GD	0.07	6.69
141	10/18/84	AM	AA5-GD	0.05	5.54
142	10/18/84	AM	AA6-GD	0.05	5.21
143	10/18/84	AM	AA7-GD	0.07	6.78
144	10/18/84	AM	AA8-GD	0.12	11.42
145	10/18/84	AM	AA9-GD	0.05	8.41
146	10/18/84	AM	AA9-GDD	0.04	5.82
147	10/18/84	AM	AAB-GD	0.04	5.64
148	10/17/84	PM	BB1-GD	0.41	7.33
149	10/17/84	PM	BB1-1FT	9.58	6.88
150	10/17/84	PM	BB1-2FT	4.16	6.69
151	10/17/84	PM	BB2-GD	0.37	11.67
152	10/17/84	PM	BB3-GD	0.17	7.26
153	10/17/84	PM	BB4-GD	0.54	13.86
154	10/17/84	PM	BB4-1FT	0.26	7.53
155	10/17/84	PM	BB4-2FT	0.10	4.53
156	10/18/84	AM	CC1-GD	0.11	5.84
157	10/18/84	AM	CC2-GD	1.85	11.41

ENERGY LABORATORIES

ENERGY LABORATORIES, INC.

P O BOX 30916 · 1107 SOUTH BROADWAY · BILLINGS, MT 59107-0916 · PHONE (406) 252-6325

LABORATORY REPORT

Lab. No. 84-8908

To Riedel International Date 10-22-84 sam

Address P.O. Box 3320 Portland, Oregon 97208-3320

SOIL ANALYSIS - QUALITY ASSURANCE

Motherlode Project - Helena, Montana
Samples Received 10-13-84 and 10-14-84

1. Duplicate Analyses: The following samples were extracted and tested in duplicate.

SAMPLE NUMBER	DATE SAMPLED	TIME SAMPLED	LOCATION SAMPLED	DUPLICATE CYANIDE, ug/g as rec'd	DUPLICATE MOISTURE % as rec'd
10	10/12/84	1345	D2-GD	0.90	1.80
20	10/12/84	1433	H3-GD	0.49	3.24
30	10/12/84	1607	F1-1FT	215	6.19
40	10/12/84	1623	F2-1FT	5.61	3.25
50	10/12/84	1714	LFP-3	1.73	2.08
60	10/12/84	Field Blank	LFP-9	0.14	1.94
68	10/13/84	1758	I2-2FT	0.07	1.41
78	10/13/84	1817	M2-2FT	0.07	6.16
88	10/13/84	1827	M7-2FT	0.07	3.74
98	10/13/84	1851	LFP5-2FT	76.8	5.47
108	10/13/84	1657	LFP5-1FT	43.5	5.85
118	10/13/84	1136	M7-GD	0.50	8.83
128	10/13/84	1115	M1-GD	0.63	8.68
145	10/18/84	AM	AA9-GD	0.12	5.85
155	10/17/84	PM	BB4-2FT	0.06	4.50

2. Reference Sample Analysis: This reference sample (from Environmental Resource Associates) was tested several times during the analysis of cyanide in the soil extracts. The true value for the reference sample is 0.118 mg/l. Analysis of the sample gave the following concentrations:

0.107	0.113	0.109
0.111	0.106	0.111
0.113	0.111	0.109

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P.O. BOX 30916 · 1107 SOUTH BROADWAY · BILLINGS, MT 59107-0916 · PHONE (406) 252-6325

LABORATORY REPORT

Lab No. 8--3908

To Riedel International Date 10-22-84 sam

Address P.O. Box 3320 Portland, Oregon 97208-3320 6

SOIL ANALYSIS

Motherlode Project - Helena, Montana
Samples Received 10-13-84 and 10-14-84

SAMPLE NUMBER	DATE SAMPLED	TIME SAMPLED	LOCATION SAMPLED	SILVER ug/g as rec'd	MOISTURE % as rec'd
5	10/12/84	1325	E1-GD	44.6	4.45
6	10/12/84	1325	F1-GD	32.6	7.07
7	10/12/84	1335	G1-GD	308	8.13
29	10/12/84	1605	E1-1FT	14.1	6.08
30	10/12/84	1607	F1-1FT	13.5	6.22
30 (Dup)	10/12/84	1607	F1-1FT	14.0	6.22
33	10/12/84	1530	R3-GD	65.9	8.0
36	10/12/84	1602	D1-1FT	23.4	11.2

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PT

D

LABORATORY REPORT

Lab. No. 84-9436 thru 84-9439

To Riedel International

Date 11-1-84 sam

Address P.O. Box 3320 Portland, Oregon 97208-3320

WATER ANALYSIS

Motherlode Site #13
Samples Submitted 10-29-84

LAB NUMBER	SAMPLE I.D.	TOTAL CYANIDE, mg/1
84-9436	Motherlode MW Sampled 10-25-84 @ 9:45 AM	0.85
84-9437	MW #1 Sampled 10-25-84 @ 10:30 AM	<0.01
84-9438	MW #2 Sampled 10-25-84 @ 11:30 AM	<0.01
84-9439	MW #3 Sampled 10-25-84 @ 12:00 PM	<0.01

RECEIVED
NOV 14 '84
ENVIR[illegible] SERVICES

LINCOLN

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SEVEN-UP PETE PA#: 25-020

Date: September 7, 1993 Time: 1030

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: Pierson, TD&H
S. Babits, Pioneer

Visitors: Chuck Rose, Phelps Dodge

Weather/Seasonality Observations: Clear; warm (60°F); still; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): Photos taken were misplaced. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Two mills on-site; one never used, one with no tailings.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Possible to reprocess waste rock for iron; revegetation is possible with coversoil. Remove WR-1 from drainage. Adit discharge is near neutral pH with no exceedances of Maximum Contaminant Levels (primary); treatment may not be needed.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SEVEN-UP PETE PA#: 25-020

Legal Description: T 14N ;R 7W ;Sec. 29 , NE1/4 ___1/4 ___1/4

County: LEWIS AND CLARK Mining District: LINCOLN

Latitude: N 46° 57' 30" Longitude: W 112° 30' 00"

Primary Drainage Basin and Code: Blackfoot River/17010203
Secondary Drainage Basin: Seven-Up Pete Creek

USGS Quadrangle map name(s): Swede Gulch

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Chuck Rose, Phelps Dodge Corp., P.O. Box 1117, Lincoln, MT 59639; Greta Amberman, 11 Nichols Road, Pomtons Plain, NJ 07444; Dave Muir, 14831 NE 12th, Belleview, WA 98007; Irene Hunter, 1207 Rancho Road, Centralia, WA 98531.

Relationship to other mines/sites in the area/district: Blackfoot tailings are located 3 miles west on Hwy. 200.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Exploration permit; reclamation surrounds property; no reclamation on-site.

General site features: Elevation 6000' , Slope 30° ,
Aspect West and South

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? < 1 acres.
Dimensions:___

Predominant vegetation types: Douglas fir

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).
Locked Phelps Dodge gate and a locked Forest Service gate

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 10 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Several tributaries (perennial and unnamed) to Seven Up Pete Creek drain the site.

Mining/milling history, ore type/tenor, host rock, gangue: Two mills; history unknown.

Mine Operation?
Shafts - Yes ___, No X , # ___, Comment ___
Adits - Yes X , No ___, # 5 , Comment 1 open
Pits - Yes ___, No X , # ___, Comment ___
Placers - Yes ___, No X , # ___, Comment ___
Other - Yes ___, No X , # ___, Comment ___

Mill Operation? Yes X , No ___. If yes answer the next three questions:

Period(s) of Operation: Unknown

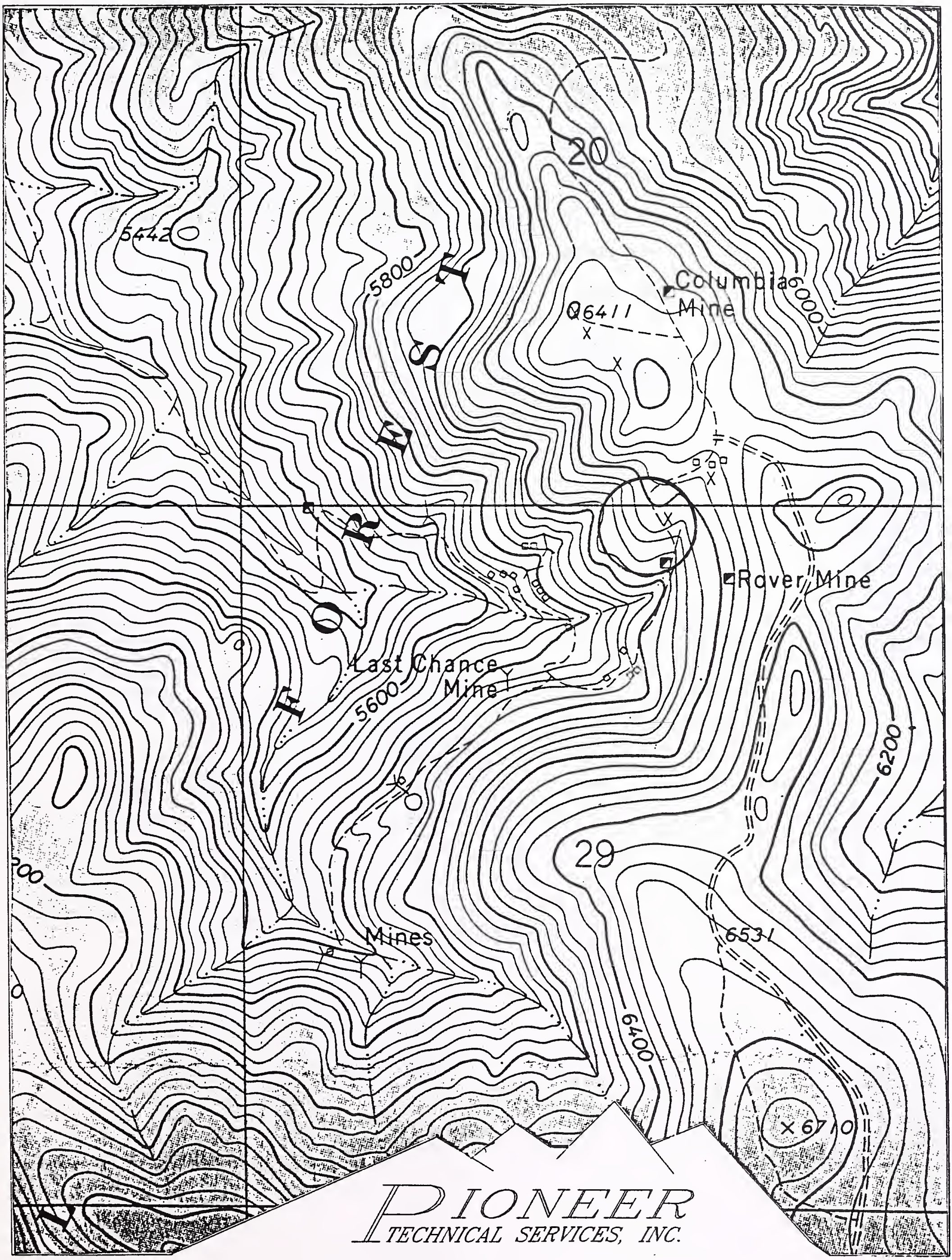
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Unknown

Montana Bureau of Mines and Geology
Water Well Log Data

11/12/1993

Well No.	Location	Depth	Yield	Static Water Level
M:70413	14N 07W 20 AB	10.0	0.0	0.00
M:70414	14N 07W 20 CA	120.0	0.0	86.00
M:70415	14N 07W 20 CD	146.0	0.0	140.00
M:70416	14N 07W 21 CA	15.0	0.0	0.00
M:70418	14N 07W 28 AC	43.0	0.0	21.00
M:121750	14N 07W 28 DDB	103.0	0.0	83.00
M:121751	14N 07W 29 AD	20.0	0.0	3.75
M:70419	14N 07W 29 BC	382.0	0.0	325.00
M:121752	14N 07W 29 CBD	40.0	0.0	24.00
M:121753	14N 07W 29 CC	83.0	0.0	58.00

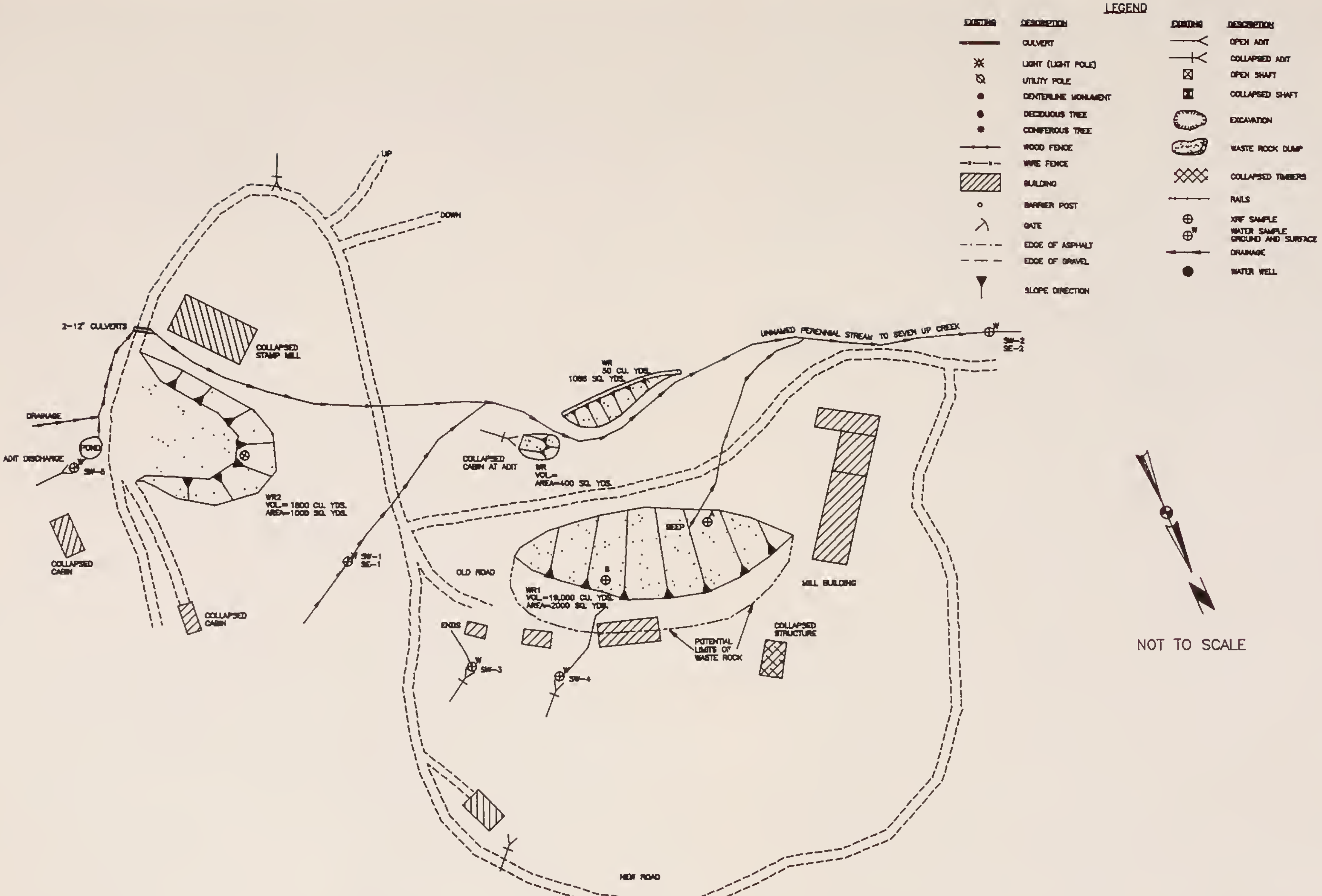


PIONEER TECHNICAL SERVICES, INC.

SEVEN-UP PETE, P.A. NO. 25-020

T14N, R07W, SECTION 29

SCALE: 1" = 1000'



DRAWN JJP DATE 30 SEPT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SEVEN–UP PETE PA# 25–020
LINCOLN DISTRICT LEWIS & CLARK COUNTY

SHEET NO.

25–020.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Handful of tailings seen near stamp mill; fine sand.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Handful of tailings seen near stamp mill.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	19,000	Near creek, west side	None	6.2 (D)	0.04	25-020-WR-1	09/07/93 2000	T-Metals, ABA
WR-1B	WR		Near top, in middle of dump	None	5.8 (D)	0.05			
WR-2A	WR	1,800	Center of dump, west side	None	6.2 (D)	0.04	25-020-WR-2	09/07/93 2005	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-020-WR-1 is composite of WR-1A and -1B. 25-020-WR-2 is WR-2A.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 3 Identification: At WR-1 and WR-2

Filled shafts: Yes___, No X , Number:____ Identification:________

Seeps/Springs: Yes X , No___, Number: 3 Identification: Near adits

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 74

Distance to nearest well used for drinking? 0.5 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Uncontained source with elevated metal values.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Adit discharge at WR-1	2 gpm (E)	6.83	269	240	6.8	69.4	NM	N/A	N/A	Field Parameters
SW-4	AD	Adit discharge at WR-1	NM	6.90	255	NM	7.2	NM	NM	N/A	N/A	Field Parameters
SW-5	AD	Adit discharge at WR-2	2 gpm (E)	8.36	279	149	7.3	140.2	NM	25-020-SW-5	09/07/93 1345	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Unnamed perennial tributaries to Seven-Up Pete Creek

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-1

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 10 gpm during sampling
High Flow: 25 gpm, Average Flow: 10 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Adit discharge through WR-1

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes X,
No ___, Distance downstream (ft)? 500 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Some erosion and sedimentation of WR-1 in tributary.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	200′ upgradient in unnamed tributary	8.25	214	166	7.8	100.0	3 gpm (E)	25-020-SW-1	09/07/93 1430	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
SE-1	SE	200′ upgradient in unnamed tributary	N/A	N/A	N/A	N/A	N/A	N/A	25-020-SE-1	09/07/93 1430	T-Metals
SW-2	SW	Downgradient at toe of WR-1 in unnamed tributary	8.35	248	314	7.2	110.8	10 gpm (E)	25-020-SW-2	09/07/93 1245	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
SE-2	SE	Downgradient at toe of WR-1 in unnamed tributary	N/A	N/A	N/A	N/A	N/A	N/A	25-020-SE-2	09/07/93 1245	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No X, Describe:

Carbonate rocks/soils: Yes___, No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 0.5 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	None	Moist	18,000	18,000	Yes	Low
WR-2	None	Moist	9,000	9,000	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_, Describe:______________________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments______________________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads?_Two locked gates_

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______________
Wilderness Area - Yes___, No_X_, Comment______________
T&E Species Habitat - Yes_X_, No___, Comment_Grizzly, Bald Eagle_
Bat Habitat - Yes_X_, No___, Comment_Adit_

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___ Adit at WR-2

Hazardous structures: Yes_X_, No___, Number_6_, types and locations:_ Two mills and four cabins

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______________________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______________________________

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_Wooden buildings_

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II, Problem Area Data Sheet for Seven-Up Pete, Prepared by Dick Juntenun, September 9, 1981.

MDSL/AMRB Files, Non-Coal Underground Abandoned Mine Reclamation Inventory Field Form, Date Unknown.

USGS, Topographic Map, Swede Gulch, Montana, 7 1/2 minute Quadrangle, 1968.

LABORATORY ANALYTICAL DATA

SEVEN-UP PETE
PA NO. 25-020

Seven Up Pete PA# 25--020
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 09/07/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-020-SE-1	26.3 J	290 J	1.2 U	6.5	11.9	23.7 J	14000	0.238 J	1310 J	34.2 J	22.2 J	14.3 U	132 J	NR
25-020-SE-2	185 J	220 J	0.6	15.7	14.9	52.3 J	25000	0.084 J	462 J	61.8 J	10.1 J	5.79 U	61.6 J	NR
25-020-WR-1	309 J	180 J	0.6 U	3.73	6.27	36.4 J	25000	0.49 J	93.3 J	10.9 J	27.3 J	6.99 U	51 J	NR
25-020-WR-2	71.1 J	228 J	1.0 U	6.73	4.47	21.6 J	16400	0.829 J	292 J	18.2 J	35.1 J	5.9 U	55.7 J	NR
BACKGROUND	19.5 J	168 J	1.0 U	9.67 J	36.5 J	228 JX	12800	0.032 UX	468	30.4 J	34.4	6.95 UJ	66.9 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-020-WR-1	0.43	13.4	1.3	-12.	0.23	0.05	0.15	1.56	-0.26
25-020-WR-2	0.17	5.31	0.54	-4.7	0.09	0.02	0.06	0.62	-0.09

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-020-SW-1	3.97	202	2.57 U	9.7 U	6.83 U	11 J	1300	0.19 JX	130	17.1 JX	3.4	30.7 U	16.6 J	100
25-020-SW-2	5.41	128	2.93 J	9.7 U	6.83 U	11.7 J	395	0.12 UJX	43.1	25.3 JX	3.8	30.7 U	21.4 J	130
25-020-SW-5	9.14	29.1	4.6 J	9.7 U	6.83 U	6.17 J	256	0.15 JX	87.5	24.7 JX	2.17	30.7 U	36.4 J	148

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-020-SW-1	191	< 5.0	12	0.22	NR
25-020-SW-2	256	< 5.0	42	< 0.05	NR
25-020-SW-5	276	< 5.0	47	0.37	NR

LEGEND

SE1 – 200 feet upgradient in unnamed tributary.
SE2 – Downgradient at toe of waste rock dump 1 in unnamed tributary.
WR1 – Composite of WR1A and 1B.
WR2 – Sample of the WR2A subsample.
BACKGROUND – From the Swansea Tailings (25-208-SS-1).
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.
SW5 – Adit discharge at waste rock dump 2.

XRF ANALYSIS RESULTS

SEVEN-UP PETE
PA NO. 25-020

MDSL AMRB/PIONEER 4/9/93

Mine Name: Seven Up Pete/Rover PA# 25-020
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-020-WR1-A			1670.42	5933.87			46109.6			63.9306 *	683.141	1013.47
25-020-WR1-B			5234.97	3238.74		1036.18	33348.3	314.025 *	46.9606 *	103.956 *	175.565	139.148
25-020-WR2-A			2972.88	3130.11		560.884 *	28784.1			77.9935 *	185.158	644.303
25-020-WR2-A-DUP			2797.84	2919.95		588.128 *	29146.7			85.1421 *	152.189	635.477
25-020-WR-1-COMP			3268.26	3826.71		864.94 *	35715			116.915 *	304.653	369.663

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-020-WR1-A	228.897	51.4433 *	836.935		244.389			1839.75	238.59 *		22.9205 *
25-020-WR1-B	207.684				171.084			2335.61	171.431 *		18.1457 *
25-020-WR2-A	196.319		81.1768		116.693			1934.29	143.636 *		18.0161 *
25-020-WR2-A-DUP	191.65		79.322	18.8089 *	114.378			1993.26	164.828 *		17.8594 *
25-020-WR-1-COMP	185.072		250.756		194.68			1888.3	129.736 *		16.0417 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SEVEN-UP PETE
PA NO. 25-020

AIMSS SCORESHEET

SITE NAME: SEVEN-UP PETE
PA NUMBER: 25-020

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.053
6	GW - TARGETS	WELLS - 1 MI. x 2.5		25.0
7		WELLS - 1 TO 4 MI		64
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	94.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	57396
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.187
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	28
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	62465
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.031
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	50
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	155
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.030
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	9
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**1.20**

SITE NAME: SEVEN-UP PETE
PA NUMBER: 25-020

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	240
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	290
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**8.70**

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BLACKFOOT TAILINGS PA#: 25-322

Date: September 7 and 8, 1993 Time: 1530/0730

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: S. Babits, Pioneer
Pierson, TD&H

Visitors: Earl McCurley, MDSL
Sana Yost, Hydrometrics, Inc.

Weather/Seasonality Observations: Warm (65°F); clear; slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): Photos taken were misplaced. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Removal or encapsulation

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BLACKFOOT TAILINGS PA#: 25-322

Legal Description: T 14N ;R 9W ;Sec. 29 , E 1/2NE 1/4 NE1/4

County: LEWIS AND CLARK Mining District: LINCOLN

Latitude: N 46° 56' 33" Longitude: W 112° 45' 10"

Primary Drainage Basin and Code: Blackfoot River/17010203
Secondary Drainage Basin: Lincoln Gulch

USGS Quadrangle map name(s): Moose Creek

Mine Type/Commodities: Tailings Dump (Millsite)

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Rod Bullis, Helena National Forest, Lincoln Ranger Station, Lincoln, MT 59639; Robert Love, Lincoln, MT 59639; Helena National Forest.

Relationship to other mines/sites in the area/district: Tailings are from Mike Horse site.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 4540', Slope < 10°,
Aspect East

Land use: Mining X , Recreational___, Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.8 acres.
Dimensions:

Predominant vegetation types: Lodgepole and ponderosa pines, wild rose, kinniKnick

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).
Adjacent to Highway 200

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 38 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Located within the Blackfoot drainage, a tributary to the Clark Fork of the Columbia River. The site lies at the east end of the area known as the Blackfoot Canyon.

Mining/milling history, ore type/tenor, host rock, gangue: 1905 to Unknown; reopened in the 1930's. Country rock is light gray diorite that is intrusive into limy argillite of the Belt series; 75% andesite, remainder is hornblende and biotite.

Mine Operation?
Shafts - Yes , No X , # , Comment
Adits - Yes , No X , # , Comment
Pits - Yes , No X , # , Comment
Placers - Yes , No X , # , Comment
Other - Yes , No X , # , Comment

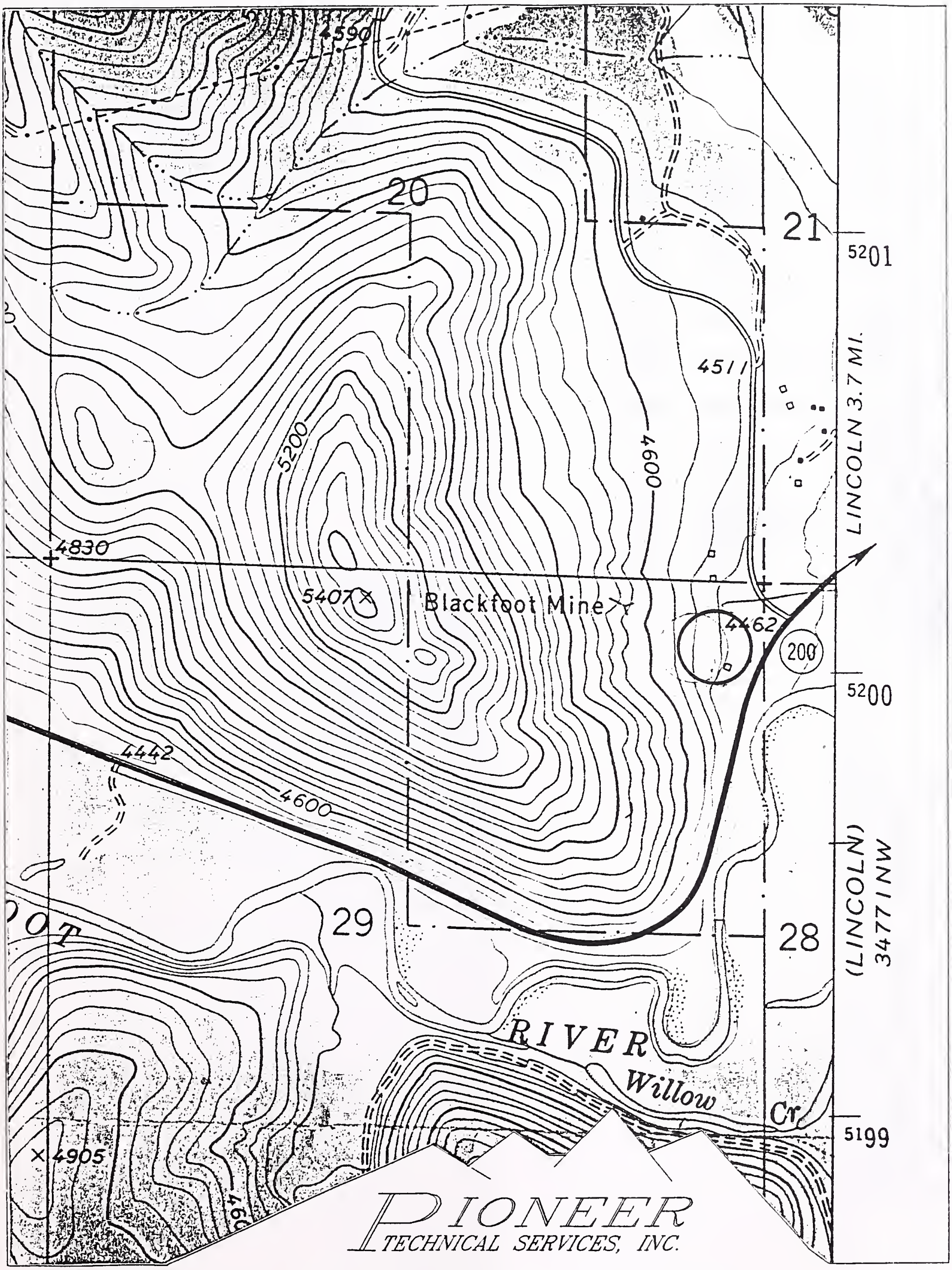
Mill Operation? Yes X , No . If yes answer the next three questions:

Period(s) of Operation: 1905 to Unknown; reopened in the 1930's.

Origin of Ore Milled - Custom Mill Dedicated Mill X ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
Cyanide plant/mill

Well No.	Location	Depth	Yield	Static Water Level
M:70531	14N 09W 20 AA	95.0	10.0	30.00
M:70530	14N 09W 20 AA	72.0	6.0	20.00
M:70536	14N 09W 21	50.0	40.0	15.00
M:70540	14N 09W 21	53.0	99.0	12.00
M:70533	14N 09W 21	47.0	30.0	17.00
M:70537	14N 09W 21	48.0	25.0	19.00
M:70539	14N 09W 21	45.0	10.0	31.00
M:70535	14N 09W 21	48.0	0.0	14.00
M:70534	14N 09W 21	49.0	30.0	16.00
M:70538	14N 09W 21	148.0	10.0	32.00
M:70532	14N 09W 21	240.0	15.0	38.00
M:70541	14N 09W 21 AD	28.0	20.0	10.00
M:70542	14N 09W 21 C	27.0	20.0	16.00
M:70544	14N 09W 21 C	40.0	30.0	8.00
M:70543	14N 09W 21 C	27.0	50.0	12.00
M:120747	14N 09W 21 CB	100.0	40.0	4.00
M:70545	14N 09W 21 CBCD	27.0	100.0	27.00
M:70546	14N 09W 21 CBCD	12.0	50.0	12.00
M:70547	14N 09W 21 CCBC	12.0	50.0	12.00
M:120748	14N 09W 21 CDD	50.0	35.0	18.00
M:70548	14N 09W 21 DB	146.0	1.0	33.00
M:70549	14N 09W 21 DB	38.0	16.0	30.00
M:70550	14N 09W 21 DB	87.0	5.0	40.00
M:128271	14N 09W 21 DBB	50.0	15.0	35.00
70553	14N 09W 21 DC	31.0	15.0	4.00
70552	14N 09W 21 DC	43.0	50.0	8.00
M:70551	14N 09W 21 DC	32.0	15.0	6.00
M:70689	14N 09W 28	28.0	450.0	22.00
M:70690	14N 09W 28	47.0	1.0	22.00
M:123625	14N 09W 28 A	55.0	10.0	6.00
M:70691	14N 09W 28 ACDA	20.0	50.0	20.00
M:70692	14N 09W 28 AD	25.0	0.0	1.00
M:122216	14N 09W 29 AAC	202.0	0.0	61.01
M:122219	14N 09W 29 ABD	201.0	0.0	195.65
M:70693	14N 09W 30	0.0	0.0	0.00
M:70694	14N 09W 30 AA	49.0	150.0	3.00
M:70695	14N 09W 30 AACC	18.0	7.0	18.00
M:70696	14N 09W 30 AACC	18.0	0.0	18.00

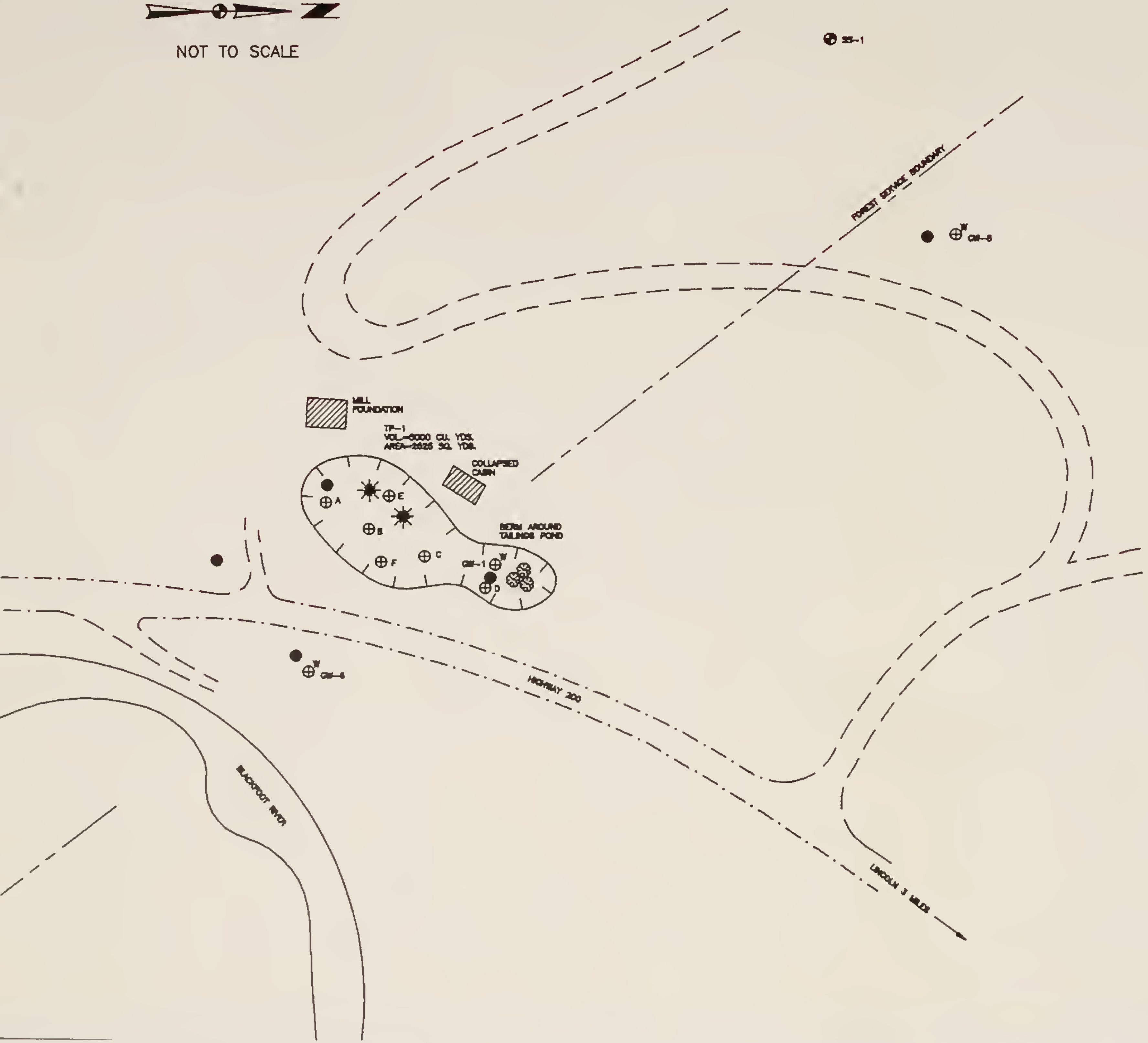


PIONEER TECHNICAL SERVICES, INC.

BLACKFOOT TAILINGS, P.A. NO. 25-322

T14N, R09W, SECTION 29

SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
═══	CULVERT	─<	OPEN ADIT
✳	LIGHT (LIGHT POLE)	─┼<	COLLAPSED ADIT
⌀	UTILITY POLE	☒	OPEN SHAFT
●	DECIDUOUS TREE	■	COLLAPSED SHAFT
✱	CONIFEROUS TREE	○	EXCAVATION
────	WOOD FENCE	○	WASTE ROCK DUMP
─x──x─	WIRE FENCE	⨯⨯⨯	COLLAPSED TIMBERS
▨	BUILDING	─┼─┼─	RAILS
∘	BARRIER POST	●	SOIL SAMPLE
⌒	GATE	⊕	XRF SAMPLE
─ · ─	EDGE OF ASPHALT	⊕W	WATER SAMPLE GROUND AND SURFACE
─ ─	EDGE OF GRAVEL	←─	DRAINAGE
▼	SLOPE DIRECTION	●	WATER WELL

DRAWN JTP
DESIGNED TPB
APPROVED WJB
DATE 30 SEPT 93
JOB NO. 93-17
F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BLACKFOOT TAILINGS PA# 25-322
LINCOLN DISTRICT LEWIS & CLARK COUNTY

SHEET NO.

25-322.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): 10% clay, 55% sand, 35% silt

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Depth ranges from < 1 to 10 feet and appears to have an oxidized and reduced zone.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Upper coarse material is dry; lower fines are saturated.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Berm (earth) is intact around the pond parameter.

Comments on potential for mitigation: Removal or encapsulation

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	5,000	South end of pond; 0'-3', green/gray medium-grained dry sand	None	< 3.5 (D)	0.04	25-322-TP-1A-A	09/07/93 1700	T-Metals, ABA, CEC, MA, CN
TP-1A-B	TAIL		3'-5', brown medium-grained partially saturated sand	None	< 3.5 (D)	0.04	25-322-TP-1A-B	09/07/93 1700	T-Metals, ABA, CEC, MA, CN
TP-1A-C	TAIL		5'-6', dark brown/black clay and brown flowing sand, saturated	None	< 3.5 (D)	0.04	25-322-TP-1A-C	09/07/93 1700	T-Metals, ABA, CEC, MA, CN
TP-1A-D	TAIL		6'-7', dark brown to black loam	None	< 3.5 (D)	0.04	25-322-TP-1A-D	09/07/93 1700	T-Metals, ABA, CEC, MA, CN
TP-1A-E	TAIL		7'-8', dark purple medium-grained sand to gravels, saturated	None	< 3.5 (D)	0.05	25-322-TP-1A-E	09/07/93 1700	T-Metals, ABA, CEC, MA, CN
TP-1B-A	TAIL		50' north of TP-1A; 0'-3', tan sand	None	< 3.5 (D)	0.03	25-322-TP-1B-A	09/07/93 1705	T-Metals, CN
TP-1B-B	TAIL		3'-5', orange sand with clay layers, partially saturated	None	< 3.5 (D)	0.05	25-322-TP-1B-B	09/07/93 1705	T-Metals, CN
TP-1B-C	TAIL		5'-7', brown dry clay	None	< 3.5 (D)	0.03	25-322-TP-1B-C	09/07/93 1705	T-Metals, CN
TP-1B-D	TAIL		7'-10', dark brown loam	None	< 3.5 (D)	0.02	25-322-TP-1B-D	09/07/93 1705	T-Metals, CN
TP-1B-E	TAIL		10', dark purple sand	None	< 3.5 (D)	0.03	25-322-TP-1B-E	09/07/93 1705	T-Metals, CN
TP-1C-A	TAIL		66' north of TP-1B; 3"-1.5', gray sand with clay	None	< 3.5 (D)	0.03	25-322-TP-1B-D	09/07/93 1720	T-Metals, ABA, CEC, MA, CN
TP-1C-B	TAIL		1.5'-2', orange sand	None	< 3.5 (D)	0.03	25-322-TP-1B-E	09/07/93 1720	T-Metals, ABA, CEC, MA, CN
TP-1C-C	TAIL		2'-3', orange clay	None	< 3.5 (D)	0.04	25-322-TP-1B-B	09/07/93 1720	T-Metals, ABA, CEC, MA, CN
TP-1C-D	TAIL		3'-4', dark brown loam	None	< 3.5 (D)	0.02	25-322-TP-1B-C	09/07/93 1720	T-Metals, ABA, CEC, MA, CN
TP-1C-E	TAIL		4', dark purple sand	None	< 3.5 (D)	0.02	25-322-TP-1C-E	09/07/93 1720	T-Metals, ABA, CEC, MA, CN

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: *Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: Babits, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1D-A	TAIL		Northeast 1/4 of TP-1; 0'-1.5', orange and gray clay	None	< 3.5 (D)	0.03	25-322-TP-1D-A	09/07/93 1725	T-Metals, CN
TP-1D-B	TAIL		1.5'-2.5', dark brown loam	None	< 3.5 (D)	0.03	25-322-TP-1D-B	09/07/93 1725	T-Metals, CN
TP-1D-C	TAIL		2.5', dark purple sand	None	< 3.5 (D)	0.02	25-322-TP-1D-C	09/07/93 1725	T-Metals, CN
TP-1E-A	TAIL		25' west of TP-1B; 2"-1.5', gray sand	None	< 3.5 (D)	0.05	25-322-TP-1E-A	09/07/93 1730	T-Metals, CN
TP-1E-B	TAIL		1.5'-4', orange sand to clay	None	< 3.5 (D)	0.03	25-322-TP-1E-B	09/07/93 1730	T-Metals, CN
TP-1E-C	TAIL		4'-4.2', dark brown loam	None	< 3.5 (D)	0.03	25-322-TP-1E-C	09/07/93 1730	T-Metals, CN
TP-1E-D	TAIL		4.2', dark purple sand	None	< 3.5 (D)	0.02	25-322-TP-1E-D	09/07/93 1730	T-Metals, CN
TP-1F-A	TAIL		25' feet of TP-1B; 0'-1.2', gray sand	None	< 3.5 (D)	0.04	25-322-TP-1E-A	09/07/93 1735	T-Metals, CN
SS-1	BKGRND	N/A	Background soil above mine	N/A	6.0 (D)	0.03	25-322-SS-1	09/08/93 0805	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs:

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 404

Distance to nearest well used for drinking? 1/4 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite_X_, Probable____, Possible____, Unlikely____.
Uncontained source (tailings) with elevated metal values, low pH, and shallow groundwater in contact with tailings. Groundwater samples have metals elevated above Maximum Contaminant Levels.

Other observations/notes: Two piezometers (4" perforated PVC) were installed (date unknown) by Sunshine Mining in the tailings impoundment; T-1 on the south end of the impoundment was dry (total depth, 8.4') and T-2 on the north end of the impoundment had a static water level of 2.9' bgs and a TD of 5.7'. A third piezometer was installed out of the impoundment 150' to the south. Sunshine Mining had several other wells installed surrounding the impoundment (in support of a mine permit). Only four of these wells currently exist. BMW-E is across Hwy. 200 from the impoundment.

GROUNDWATER INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	MW	North end of site; SWL 2.9' bgs and TD 5.7' bgs (T-2)	N/A	6.35	323	109	11.7	NM	5.7	25-322-GW-1	09/07/93 1635	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, D-Metals, CN-
GW-5	MW	On drill pad behind chimney west of site; SWL 7.32' bgs and TD 35' bgs (#36)	N/A	7.38	305	165	6.7	NM	35	25-322-GW-5	09/09/93 1530	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, D-Metals, CN-
GW-6	MW	Between Blackfoot River and Hwy. 200 east of site; SWL 3.79' bgs and TD 37' bgs (BMW-E)	N/A	7.60	393	171	7.4	NM	37	25-322-GW-6	09/09/93 1700	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, D-Metals, CN-

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): GW-5 and -6 were purged and sampled by Hydrometrics, Inc., with a mechanized bailer due to the large volume of water that needed to be purged (56 gallons for GW-5 and 84 gallons for GW-6). NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
180 feet to the Blackfoot River, separated by the highway.

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, wetland, recreation, agriculture, T&E habitat - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes_____,
No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): N/A; Highway between tailings and river.

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000 X ; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	SO3; low pH	Partial	22,725	22,725	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes___, No_X_, Describe:____

Accessibility - Fences, warning signs, closed roads?_Unrestricted_

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes_X_, No___, Comment_Grizzly, Bald Eagle_
Bat Habitat - Yes___, No_X_, Comment____

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:____

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Partially collapsed cabin (assay office)

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:____

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_Wood cabin_

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LABORATORY ANALYTICAL DATA

BLACKFOOT TAILINGS
PA NO. 25-322

MDSL AMRB/PIONEER 4/9/93

Blackfoot Tailings PA# 25-322
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 09/07/93
Page 1 of 2.

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-322-TP1A-A	87.2 J	74.6 J	7.8	6.43	3.89	163 J	45100	2.14 J	15.2 J	8.35 J	4360 J	6.02 U	1330 J	0.299 U
25-322-TP1A-B	156 J	69.5 J	0.9	4.3	3.9	57.9 J	27500.0	0.2 J	27.6 J	8.0 J	117.0 J	8.0 U	200.0 J	0.328 U
25-322-TP1A-C	84.6 J	93.9 J	3.0	4.17	8.43	102 J	34700	0.144 J	58 J	10.3 J	253 J	5.53 U	497 J	0.311 U
25-322-TP1A-D	112 J	203 J	114.0	4.98	38.8	4440 J	27900	0.484 J	56.4 J	19.8 J	21.3 J	9.44 U	1340 J	0.396 U
25-322-TP1A-E	14.8 J	94.5 J	2.0	9.12	9.84	118 J	13000	0.076 J	59.7 J	27.2 J	33 J	5.96 U	1930 J	0.327 U
25-322-TP1B-A	70 J	274 J	4.3	1.71 U	1.75	617 J	17600	0.837 J	16.2 J	2.23 U	8700 J	5.4 U	842 J	0.289 U
25-322-TP1B-B	79.2 J	52.9 J	1.3	2.51	3.59	58.9 J	28200	0.081 J	33.7 J	5.84 J	120 J	5.65 U	157 J	0.302 U
25-322-TP1B-C	258 J	163 J	9.9	5.73	20.5	273 J	52100	0.263 J	113 J	18.6 J	119 J	7.16 U	1140 J	0.317 U
25-322-TP1B-D	33.7 J	225 J	70.1	12.3	19.3	338 J	21400	0.069 J	275 J	44.4 J	48 J	10.8 U	7380 J	0.43 U
25-322-TP1B-E	16.9 J	93.7 J	17.8	4.93	15.2	802 J	14600	0.076 J	130 J	14.5 J	74 J	7.78 U	1240 J	0.309 U
25-322-TP1C-A	402 J	51.2 J	21.5	54.3	2.97	243 J	205000	0.032 UJ	60.1 J	57.9 J	3830 J	5.66 U	2970 J	0.307 U
25-322-TP1C-B	338 J	45.7 J	4.5	4.92	30.1	483 J	53100	0.369 J	108 J	9.6 J	45.9 J	6.33 U	758 J	0.323 U
25-322-TP1C-C	108 J	144 J	40.4	13.8	27.1	2080 J	82400	0.373 J	282 J	23 J	206 J	8.37 U	1860 J	0.411 U
25-322-TP1C-D	49.4 J	236 J	61.9	13.2	20.4	205 J	21300	0.104 J	306 J	40.7 J	123 J	8.25	10500 J	0.371 U
25-322-TP1C-E	14.2 J	120 J	3.4	6.35	11.7	41.4 J	15400	0.042 J	149 J	18.4 J	34.8 J	7.77 U	2380 J	0.34 U
25-322-TP1D-A	97 J	292 J	2.5	6.29	17.3	370 J	84000	0.59 J	431 J	12.6 J	4950 J	7.39 U	663 J	0.387 U
25-322-TP1D-B	17.8 J	183	7.1	23.6	13.3	91.1	9990	0.146 J	547	37.9	23.7	8.96 UJ	5590 J	0.39 U
25-322-TP1D-C	5.97 J	96.7	0.6 U	6.28	7.2	36.1	8610	0.101 J	731	8.46	19.3	6.63 UJ	79.2 J	0.319 U
25-322-TP1E-A	56.5 J	115	3.0	2.8	1.6 U	21.5	13800	2.52 J	6.66	2.97 U	2770	7.19 UJ	522 J	0.31 U
25-322-TP1E-B	123 J	74.3	2.7	5.04	8.71	143	37000	0.082 J	117	6.97	143	7.02 UJ	316 J	0.363 U
25-322-TP1E-C	31.1 J	191	11.1	10.7	45.9	13400	15600	0.141 J	101	18.5	32.4	9.26 UJ	507 J	0.385 U
25-322-TP1E-D	14.1 J	170	63.9	6.28	10.5	2030	11700	0.045 J	85.6	14.5	105	6.39 UJ	691 J	0.639
25-322-TP1F-A	114 J	130	7.4	4.2	1.95	200	38300	0.78 J	64.7	2.9	4310	5.38 UJ	1080 J	0.652
BACKGROUND	10.9 J	263	0.5 U	6.96	4.52	14.9	9170	0.034 U	1100	5.71	16	6.32 UJ	44.1 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Mechanical Analysis & % Coarse Material

FIELD ID	% Clay	% Sand	% Silt	% Coarse Material (>2mm)
25-322-TP1A-A	12	57	31.0	0
25-322-TP1A-B	13	61.0	26.0	0
25-322-TP1A-C	15	46	39.0	0
25-322-TP1A-D	6	50	44.0	0
25-322-TP1A-E	8	56	36.0	0
25-322-TP1C-A	7	52	40	0
25-322-TP1C-B	5	31	64	0
25-322-TP1C-C	39	25	36	0
25-322-TP1C-D	6	54	40	0
25-322-TP1C-E	5	65	30	0

LEGEND

TP1AA - S. end of pond. 0'-3'; green/gray medium grained dry sand.
TP1AB - 3'-5'; brown medium grained partially saturated sand.
TP1AC - 5'-6'; dark brown/black clay and brown flowing saturated sand.
TP1AD - 6'-7'; dark brown to black loam.
TP1AE - 7'-8'; dark purple, medium grained sand to gravels, saturated.
TP1BA - 50' N. of TP1A borehole; 0'-3'; tan sand.
TP1BB - 3'-5'; orange sand with clay layers, partially saturated.
TP1BC - 5'-7'; brown dry clay.
TP1BD - 7'-10'; dark brown loam.
TP1BE - 10'; dark purple sand.
TP1CA - 66' North of TP1B borehole, gray sand with clay.
TP1CB - 1.5'-2'; orange sand.
TP1CC - 2' -3'; orange clay.
TP1CD - 3'-4'; dark brown loam.
TP1CE - 4'; dark purple sand.
TP1DA - NE 1/4 of TP11 borehole; orange and gray clay.
TP1DB - 1.5'-2.5'; dark brown loam.
TP1DC - 2.5';dark purple sand.
TP1EA - 25' West of TP1B borehole; 2"-1.5'; gray sand.
TP1EB - 1.5'-4'; Orange sand to clay.
TP1EC - 4'-4.2'; dark brown loam.
TP1ED - 4.2'; dark purple sand.
TP1FA - 25'East of TP1B borehole; 0-1.2'; gray sand.
BACKGROUND - Above mine. From Balckfoot Tailings
(25-322-SS-1).

Blackfoot Tailings PA# 25-322
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 09/07/93
Page 2 of 2.

(cont.) SOLID MATRIX ANALYSES

Acid/Base Accounting

Cation Exchange Capacity

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t	Cation Exchange Capacity milliequivalents/100g
25-322-TPIA-A	6.12	191	-8	-199	1.41	3.61	1.1	113	-121	4.01
25-322-TPIA-B	1.09	34.1	-11	-45	0.9	0.05	0.14	1.56	-12.4	1.84
25-322-TPIA-C	1.15	35.9	-12	-48	0.95	0.06	0.14	1.87	-13.6	3.72
25-322-TPIA-D	1.89	59	-37	-96	1.71	0.07	0.11	2.19	-39.4	<0.001
25-322-TPIA-E	1.55	48.4	-15	-64	1.11	0.3	0.14	9.37	-24.7	5.04
25-322-TPIC-A	26.9	839	-9.7	-849	0.7	15.1	11	473	-482	1.99
25-322-TPIC-B	2.15	67.2	-20	86.9	2	0.04	0.11	1.25	-21	3.44
25-322-TPIC-C	1.94	60.6	-29	-90	1.42	0.26	0.26	8.12	-37.2	11
25-322-TPIC-D	2.08	65	-39	-104	1.72	0.13	0.23	4.06	-43.4	<0.001
25-322-TPIC-E	1.03	32.2	-16	-48	0.89	0.05	0.09	1.56	-17.4	6.55
25-322-TP1A-C (Duplicate)	1.13	35.3	-11	-47	0.94	0.06	0.13	1.87	-13.3	

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-322-GW-1	633	6360	440 J	153	312	7570 J	474000	5.44 JX	15300	357 JX	26900	30.7 U	33100 J	897
25-322-GW-1(D)	5.72	7.23	29.1 J	41.2	6.83 U	2.8 J	6840	0.12 U	10500	48.7	6.76	30.7 U	8000	416
25-322-GW-5	141 JX	591	10.8	92.1	79.2	567	217000	0.12 U	8850	95.3	27.2	30.7 UJ	540	290
25-322-GW-5(D)	0.96 U	17.9	2.57 U	9.7 U	6.83 U	2.13 J	22.3	0.12 U	57.7	12.7 U	0.78	30.7 U	19	152
25-322-GW-6	17.4 JX	163	2.57 U	9.7 U	6.83 U	13.1	2300	0.16	949	12.7 U	3.1	30.7 UJ	43.2	174
25-322-GW-6(D)	4.4	92	2.57 U	9.7 U	6.83 U	3.07 J	11.8 U	0.12 U	4.08 U	12.7 U	0.89	30.7 U	28.8	200

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-322-GW-1	766	18.0	410	0.17	0.01
25-322-GW-5	210	< 5.0	5.0	0.2	< 0.01
25-322-GW-6	236	< 5.0	< 5.0	0.13	< 0.01

LEGEND

TP1ACDUP - Duplicate.
GW1 - N. end of sit; SWL 2.9' bgs and TD 5.7' bgs. (T-2).
GW1D - Sample GW1 for Total Dissolved Metals.
GW5 - On drill pad behind chimmney west of site (#36). SWL 7.32' and TD 35 bgs.
GW5D - Sample GW5 for Total Dissolved Metals.
GW6 - Between Blackfoot River and Hwy 200 East of site; SWl 3.79' and TD 37 bgs. (MW-E)
GW6D - Sample GW6 for Total Dissolved Metals.

XRF ANALYSIS RESULTS

BLACKFOOT TAILINGS
PA NO. 25-322

MDSL AMRB/PIONEER 4/9/93

Mine Name: Blackfoot Tailings PA# 25-322
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-322-TP1A-A			3188.42	9960.85			32313.2		106.481 *	729.965		30.5904
25-322-TP1A-B			7032.31	3374.08			29416.8		55.6698 *	251.411	138.263 *	286.778
25-322-TP1A-C			4194.81	2409.71			38713.5		73.302 *	500.02	83.6079 *	241.634
25-322-TP1A-D			6258.15	1575.78			36187.7		2803.32	1339.41	186.025	109.391
25-322-TP1A-E			4583.23	2214.12			20864.6		71.2804 *	1912.45	62.5795 *	107.048
25-322-TP1B-A			42643	3389.29			16510.2		335.951	411.032		47.6523

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-322-TP1A-A	170.748			2186.01	87.1033			269.951	142.748 *		14.0876 *
25-322-TP1A-B	303.032			333.944	152.603			655.665	155.022 *		15.496 *
25-322-TP1A-C	213.033			203.901	117.757			596.357	111.148 *		12.4578 *
25-322-TP1A-D	229.532				95.6214			435.561			11.6136 *
25-322-TP1A-E	255.647				108.291			426.939	117.672 *		18.8654 *
25-322-TP1B-A	191.739			4774.78	107.263			991.363	111.679 *		35.2369 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BLACKFOOT TAILINGS
PA NO. 25-322

AIMSS SCORESHEET

SITE NAME: BLACKFOOT TAILINGS
PA NUMBER: 25-322

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
2		EXCEEDENCES		100
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	800
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.316
6	GW - TARGETS	WELLS - 1 MI. x 2.5		95.0
7		WELLS - 1 TO 4 MI		366
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	466.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1236205
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.719
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	27
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	4017
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	150
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.330
29	AIR - TARGETS	POPULATION - 4 MILES		300
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	320
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	15840
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.297
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	15
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	891
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**12.57**

SITE NAME: BLACKFOOT TAILINGS
PA NUMBER: 25-322

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	40
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	15
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**12.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

TABLE 3. SUNSHINE MINE SOILS LABORATORY ANALYSIS

SAMPLE SITE	SS-2			SS-3		SS-4			SS-5				
DEPTH, inches	0-6	6-30	30-60+	0-4	4-24	0-2	2-13	13-60+	0-5	5-19	19-28	28-45	45-60
pH	6.7	7.1	7.6	6.3	7.4	5.4	5.9	5.5	6.4	6.5	7.6	7.6	7.8
Sat., %	52.0	42.0	45.4	78.2	43.5	44.7	34.7	33.0	76.3	49.3	32.1	38.0	22.1
Sand, %	23	17	15	25	25	31	23	53	23	21	55	28	66
Silt, %	63	59	59	55	53	57	55	25	55	55	41	58	25
Clay, %	14	24	26	20	22	12	22	22	22	24	4	14	9
Texture	SiL	SiL	SiL	SiL	SiL	SiL	SiL	SCL	SiL	SiL	SL	SiL	SiL
Very Fine Sand, %	11	11	5	15	9	12	14	9	12	9	1	13	1
Organic Matter, %	3.4	0.7	0.6	15.9	1.4	6.2	0.5	0.3	8.2	2.4	0.6	0.5	0.2

SAMPLE SITE	SS-6		SS-7		SS-8			SS-9		
DEPTH, inches	0-6	6-20	0-6	6-66	0-9	9-35	35-60	0-6	6-16	16-36
pH	6.0	5.7	5.0	5.3	5.5	6.1	7.8	6.2	5.2	5.7
Sat., %	27.6	36.0	31.9	31.9	33.8	33.8	38.8	46.9	28.2	34.3
Sand, %	34	28	56	62	24	20	22	26	28	24
Silt, %	55	53	35	20	66	64	64	64	58	60
Clay, %	11	19	9	18	10	16	14	10	14	16
Texture	SiL	SiL	SL	SL	SiL	SiL	SiL	SiL	SiL	SiL
Very Fine Sand, %	9	10	3	1	16	14	17	17	20	16
Organic Matter, %	0.8	0.5	1.6	0.4	1.6	1.0	0.5	2.8	0.8	0.8

TEXTURE NOTES: S = SAND(Y); Si = SILT(Y); l = LOAM(Y); C = CLAY

SAMPLE
LAD Site

DEPTH, Inches	0-4	4-10	10-20	20-30
pH	6.0	5.5	6.8	7.7
Sat., %	56.6	40.4	55.3	40.5
Cond., mmhos/cm	0.78	0.86	1.12	0.72
Ca, meq/l	5.92	2.96	7.24	4.26
Mg, meq/l	1.43	0.75	0.96	0.48
Na, meq/l	0.33	3.65	2.86	2.02
SAR	0.17	2.68	1.41	1.31
Sand, %	20	14	12	16
Silt, %	68	62	60	68
Clay, %	12	24	28	16
Texture	SiL	SiL	SiCL	SiL
Organic Matter, %	6.6	1.2	1.9	1.0
Total Cyanide, ppm	0.5	<0.5	<0.5	<0.5
*Arsenic, ppm	0.5	0.4	0.3	<0.2
*Mercury, ppm	<0.02	<0.02	<0.02	<0.02
*Cadmium, ppm	<0.1	<0.1	<0.1	<0.1
*Copper, ppm	<0.1	<0.1	<0.1	<0.1
*Lead, ppm	<0.5	<0.5	<0.5	<0.5
*Manganese, ppm	1.9	0.2	0.5	0.8
*Nickel, ppm	<0.1	<0.1	<0.1	<0.1
*Zinc, ppm	<0.1	<0.1	<0.1	<0.1
Coarse Fragments, %	21.4	9.7	5.8	4.1

*NOTE: Extraction and analysis performed according to SW-846, Test Methods for Evaluating Solid Waste

SDA TEXTURAL CLASS KEY: S = SAND(Y); Si = SILT(Y); L = LOAM(Y); C = CLAY r Valley Laboratories

Box 926 -- 303 N. TAYLOR
URN, IDAHO 83849
ONE: (208) 556-1593

515 PARK BLVD. - SUITE 1100
BOISE, IDAHO 83712

, 1985 SUSH0802.252 Taken 9-7-85 ATTN: ELTON HODSON

ST FOR:	Pb	Zn	Cu	As	Hg	Cd	Se	CN
THOD	Geo	Geo	Geo	Geo	Geo	Geo	Geo	Geo
ED:	Chem	Chem	Chem	Chem	Chem	Chem	Chem	Chem
SULTS IN:	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppm
30 4.3' tailings:	567	95	52	146	903	<.1	.2	.015
31 .9' [illegible] River gravels	15	95	99	10	487	.2	.1	.022
32 2.3' [illegible] organic	21	813	151	3	2040	6.1	.1	.041
33 1.5' tailings	3630	761	248	126	2194	2.4	.4	.015
34 2' organic [illegible]	45	245	300	10	3742	11.9	.2	.022
35 1' River gravels	20	91	27	7	1173	<.1	2	.022
36 3' River gravels	18	606	32	5	781	.3	.1	.059

1.5 are stained red.

GE 1 OF 1 CHARGES: $203.00

Wayne R. Sorensen
WAYNE SORENSEN, Chief Chemist

TABLE 2. Geochemical Analysis of Tailings Samples

Silver Valley Laboratories
P.O. Box 926 -- 308 N. TAYLOR
OSBURN, IDAHO 83849
Phone: (208) 556-1593

SUNSHINE EXPLORATION
815 PARK BLVD. - SUITE #100
BOISE, IDAHO 83712
ATTN: ELTON MODROO

SEPT.30.1985 SUSH0602.256 Taken 9-7-85

CC: ROBERT MEAD

TEST FOR:	Pb	CN	Cu	As	Hg	pH
METHOD USED:	Wet Method	Wet Method	Wet Method	Wet Method	Wet Method	Wet Method
RESULTS IN:	mg/L	mg/L	mg/L	mg/L	mg/L	pH
TAILS-1	.12	.016	28.2	.002	.00062	2.7
TAILS-2	.023	.02	.001	.003	.00014	6.4
[illegible]ILS-3	.018	.009	.002	<.001	.00022	6.7

PAGE 1 OF 1

CHARGES: $141.00

Wayne R. Sorensen
WAYNE SORENSEN, Chief Chemist

H_2O testing from Tails #1-2-3 test wells

Water samples from Piezometer

TABLE 3. SURFACE WATER MONITORING SCHEDULE - BASELINE PERIOD

BIG BLACKFOOT PROJECT

Station	Location	Sampling Dates
BF-1	Blackfoot River downgradient	5/1/86; 8/28/86; 10/30/86; 1/2/87; 4/15/87
BF-2	Blackfoot River downgradient	10/30/86; 1/2/87; 4/15/87
BF-3	Blackfoot River downgradient	6/21/85; 7/15/85; 5/1/86; 10/30/86; 1/2/87; 4/15/87; 7/16/87
BF-4	Blackfoot River upgradient	10/30/86; 1/2/87; 4/15/87; 7/16/87
BF-5	Blackfoot River upgradient	5/1/86; 10/30/86; 1/2/87; 4/15/87
LG-1	Lincoln Gulch downgradient	5/1/86; 10/30/86; 1/2/87; 4/15/87; 7/16/87
LG-2	Lincoln Gulch upgradient	10/30/86; 1/2/87; 7/16/87
LG-3	Lincoln Gulch trib. from leach pad site	10/30/86; 1/2/87; 4/15/87; 8/27/87
LG-4	Lincoln Gulch trib. upgradient (spring)	8/27/87
Sta-2	Marsh near Blackfoot River	7/15/85
GH	Upgradient Pond on Lincoln Gulch (Glory Hole)	1/21/87

NOTES: (1) See Exhibit 1 for sample sites

TABLE 5. SUMMARY OF SURFACE WATER QUALITY DATA

SITE NAME	BF #1	BF #2	BF #3 (STA #1)	BF #4	BF #5	LG #1	LG #2	LG #3	LG #4
NUMBER OF SAMPLES *	1-5	1-3	1-7	1-4	1-4	1-5	1-4	1-4	1
PHYSICAL PARAMETERS									
SPEC. COND. (UMHOS/CM) LAB			249	247		199	223	439	405
PH FIELD	8			8	8	8.25	9	8	7.7
PH LAB	7.68	7.99	7.86	8	8.16		8.26	8.04	
TOTAL FILTERABLE RESIDUAL	270	250							
COMMON IONS									
TOTAL HARDNESS AS CACO3	194	190	151	185	180	162	167	242	249
CALCIUM (CA)	44.9	44.64	38.72	43.88	41.68	31.28	33.03	68.71	76.6
MAGNESIUM (MG)	18.44	18.57	15.94	16.95	18.28	18.83	19.41	17.03	14.1
SODIUM (NA)	2.26	2.23	2.22	2.22	2.1	1.3	1.31	2.14	1.7
POTASSIUM (K)	1.17	.983	1.1	1.1	1	.833	.779	1.9	2.3
BICARBONATE AS CACO3 (LAB)	159	161	159	153	156	130	134	210	219
BICARBONATE (HCO3) (LAB)			149.6	152.5		108.9	128.5		
CARBONATE AS CO3 (LAB)	0	0	.8	0	0	3.8	2.33	0	0
SULFATE (SO4)	<10	<10	5.7	5.7	<10	5.8	5.6	6.18	3.5
CHLORIDE (CL)	.70	.6	2.14	.55	.65	.55	.417	1.19	1.63
FLUORIDE (F)			<.1						
NUTRIENTS									
NITRATE (NO3-N)	.041	.058	.105	.114	.025	.13	.128	.105	.234
ORTHO-PHOSPHATE (PO4-P)			<.005						
AMMONIA (NH3 AS N)			.085	.07		.153	.106	.091	.061
TRACE ELEMENTS									
ARSENIC (AS) TOTAL REC.	.0016	.0015	.0097	.014	.0012	.0072	.014	.0016	<.005
CADMIUM (CD) TOTAL REC.	.002	<.002	.0034	<.002	.002	.0014	.0026	<.002	<.002
CHROMIUM (CR) TOTAL REC.			<.001						
COPPER (CU) TOTAL REC.	.0031	.0043	.0025	.0022	.0033	.0027	.0034	.0044	<.01
IRON (FE) TOTAL REC.			.059	<.02		<.02	<.02	.02	.02
LEAD (PB) TOTAL REC.	.017	.02	.0094	.01	.0084	.0071	.0065	.028	.002
MANGANESE (MN) TOTAL REC.	.008		.005	<.002	.006	.003	<.002	<.002	<.002
MERCURY (HG) TOTAL REC.	.0001	<.00002	<.00002	<.00002	<.00002	.0001	.0001	<.00002	
MOLYBDENUM (MO) TOTAL REC.	<.003	<.003	.0024	.0063	<.003	.0067	.0067	.0043	
NICKEL (NI) TOTAL REC.			.011			.001			
SELENIUM (SE) TOTAL REC.	<.001		<.001	<.003	<.001	<.002	<.003	<.005	<.005
SILVER (AG) TOTAL REC.			<.001	<.002			<.002	<.007	<.007
SULFUR (S) TOTAL REC.			.01						
ZINC (ZN) TOTAL REC.	.014	.019	.015	.012	.021	.011	.0077	.026	<.005
OTHER PARAMETERS									
SILICA (SI)			112						
CYANIDE (CN) TOTAL	.002	<.002	.003	<.002	<.002	<.002	<.002	.003	.009

* NOT ALL PARAMETERS ARE REPORTED FOR EACH ANALYSIS, THEREFORE A RANGE IS USED TO REPRESENT THE NUMBER OF SAMPLES USED TO ESTABLISH THE MEAN.
ALL MEAN CONCENTRATIONS ARE IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.
FOR VALUES BELOW THE DETECTION LIMIT, ONE HALF THE DETECTION LIMIT WAS USED IN THE STATISTICAL ANALYSIS. IF THE RESULTING MEAN WAS WAS BELOW THE RANGE THEN THE LOW RANGE VALUE WAS USED FOR THE MEAN.
OUTPUT DATE: 09-14-1987

TABLE 11. GROUNDWATER MONITORING SCHEDULE

Well No.	Location	Lithology	Sampling Dates
T-1	Old Tailings Deposit	Tailings	9/7/85
T-2	Old Tailings Deposit	Tailings	9/7/85; 5/1/86; 1/2/87; 4/15/87
T-3	Old Tailings Deposit	Tailings	9/7/85; 5/1/86; 1/2/87; 4/15/87
AD	Downgradient Mine Pit	Colluvium	1/2/87; 4/15/87; 8/27/87
BD	Downgradient Leach Pad	Alluvium	1/2/87; 4/15/87
20B	Within Leach Pad	Alluvium	1/2/87; 4/15/87
Sta-3	Within Mine Pit	Bedrock	6/21/85; 7/15/85; 5/1/86; 4/15/87
Sta-4	Within Mine Pit	Bedrock	6/21/85; 7/15/85; 8/28/86; 10/30/86
BMW-87-A	Downgradient Leach Pad	Bedrock	8/24/87
BMW-87-B	Downgradient Leach Pad	Colluvium	8/21/87
BMW-87-C	Downgradient Leach Pad	Alluvium	8/20/87
BMW-87-D	Downgradient Mine Pit	Bedrock	8/24/87
BMW-87-E	Downgradient Mine Pit	Alluvium	8/24/87
BMW-87-32	South Mine Pit	Bedrock	8/20/87
BMW-87-39	East Mine Pit	Bedrock	8/21/87

NOTES: Nine private domestic wells in the project area have been sampled as follows:

10/30/86: BA, RV, DPH, LD, NA, RO, DPB, DH

1/2/87: BA, RV, DPH, LD, NA, RO, DPB, EW

4/15/87: BA, RV, DPH, LD, NA, RO, EW

TABLE 12. SUMMARY OF GROUNDWATER QUALITY DATA

SITE NAME	T #1	T #2	T #3	AD	BD	20B	BMW-87-A	BMW-87-B	BMW-87-C	BMW-87-D	BMW-87-E	BMW-87-32	BMW-87-39
NUMBER OF SAMPLES *	1	1-4	1-4	1-3	1-2	1-2	1	1	1	1	1	1	1
PHYSICAL PARAMETERS													
SPEC. COND. (UMHOS/CM) LAB				357			421	400	215	276	336	321	274
PH LAB	2.7	4.86	7.33	7.39	6.21	7.65	7.2	7.3	8	7.7	7.5	7.4	7.4
COMMON IONS													
TOTAL HARDNESS AS CACO3			192	181	281		233.7	220.3	37.1	133.8	180.5	167.4	151.8
CALCIUM (CA)		289	69.97	55.72	35.31	78.54	77.8	77.4	13.7	40.3	50.7	44.6	42.5
MAGNESIUM (MG)		282	19.03	9.04	18.11	12.9	9.58	8.5	0.706	8.06	13.1	13.6	11.1
SODIUM (NA)		5.39	2.44	4.69	7.12	1.77	2.53	2.21	32.1	8.85	2.29	4.58	3.51
POTASSIUM (K)		0.96	1.85	5.23	15.35	2.45	1.96	2.21	1.43	1.11	0.76	2.23	1.66
BICARBONATE AS CACO3 (LAB)		0	193	185	32.15	196	213.8	210.8	105.8	142.5	172.1	159.6	134.5
CARBONATE AS CO3 (LAB)		0	0	0	0	0	0	0	0	0	0	0	0
SULFATE (SO4)		1546	32.2	7.9	18.5	(10	5.87	6.17	7	3.97	6.23	8.9	6.94
CHLORIDE (CL)		1.3	2.3	5.75	1.2	(.5	3.07	0.693	1.09	1.14	0.697	1.94	0.86
NUTRIENTS													
NITRATE (NO3-N)		0.02	0.021	0.142	0.004	(.02	0.566	0.554	(.2	(.2	0.605	0.938	0.516
AMMONIA (NH3 AS N)				0.076			0.061	0.151	0.507	0.151	0.094	0.403	0.341
TRACE ELEMENTS													
ARSENIC (AS) DISS				0.022			(.005	(.005	0.006	0.025	0.007	(.005	0.005
ARSENIC (AS) TOTAL REC.	0.002	0.049	0.0045	0.045	0.175	0.044							
CADMIUM (CD) DISS				(.002			(.002	(.002	(.002	(.002	(.002	(.002	(.002
CADMIUM (CD) TOTAL REC.		0.648	0.025	0.002	(.002	(.002							
COPPER (CU) DISS				(.01			(.005	(.005	(.005	(.005	(.005	(.005	(.005
COPPER (CU) TOTAL REC.	28.2	2.73	0.102	0.011	0.067	0.014							
IRON (FE) DISS				0.011			0.061	0.065	0.086	0.245	0.069	0.074	0.07
LEAD (PB) DISS				0.017			(.005	(.005	0.007	0.016	0.013	(.005	0.028
LEAD (PB) TOTAL REC.	0.12	4.13	0.093	0.035	0.067	0.031							
MANGANESE (MN) DISS				(.002			0.001	0.004	0.017	0.038	(.001	0.005	(.001
MANGANESE (MN) TOTAL REC.		153.2	6.8										
MERCURY (HG) DISS							(.00015	(.00015	(.00015	(.00015	(.00015	(.00015	(.00015
MERCURY (HG) TOTAL REC.	0.00062	0.0017	0.0002	0.0003	0.0045	(.00002							
MOLYBDENUM (MO) TOTAL REC.		0.136	0.015	0.0088	0.0078	(.003							
SELENIUM (SE) DISS				(.005			(.005	(.005	(.005	(.005	(.005	(.005	(.005
SELENIUM (SE) TOTAL REC.		0.0013	(.001										
SILVER (AG) DISS				(.007			(.005	(.005	(.005	(.005	(.005	(.005	(.005
ZINC (ZN) DISS				0.073			0.087	0.021	0.014	0.478	0.036	0.041	0.022
ZINC (ZN) TOTAL REC.		193	7.55	0.06	0.074	0.043							
OTHER PARAMETERS													
CYANIDE (CN) TOTAL	0.016	0.0097	0.0043	0.0037	(0.002	0.002							
CYANIDE (CN) WAD							0.003	0.002	0.002	0.003	0.009	0.005	0.005

* NOT ALL PARAMETERS ARE REPORTED FOR EACH ANALYSIS, THEREFORE A RANGE IS USED TO REPRESENT THE NUMBER OF SAMPLES USED TO ESTABLISH THE MEAN.
ALL MEAN CONCENTRATIONS ARE IN MILLIGRAMS PER LITER UNLESS OTHERWISE NOTED.
FOR VALUES BELOW THE DETECTION LIMIT, ONE HALF THE DETECTION LIMIT WAS USED [illegible] THE STATISTICAL ANALYSIS. IF THE RESULTING MEAN WAS [illegible]

SUMMARY OF SURFACE WATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	BF #1	BF #1	BF #1	BF #1	BF #1	BF #2	BF #2	BF #2	BF #3 (STA #1)	BF #3 (STA #1)
SAMPLE DATE	05/01/86	08/28/86	10/30/86	01/02/87	04/15/87	10/30/86	01/02/87	04/15/87	06/21/85	07/15/85
PHYSICAL PARAMETERS										
PH FIELD			8.0							
PH LAB		7.2	8.2	7.8	7.523	8.2	8.1	7.655	7.5	7.4
TOTAL FILTERABLE RESIDUAL			270			250				
COMMON IONS										
TOTAL HARDNESS AS CACO3			219	168		210	170		45	
CALCIUM (CA)			40.2	46.0	48.49	37.2	46.5	48.21	10.8	
MAGNESIUM (MG)			28.6	12.9	13.83	28.5	13.2	14.02	11.0	
SODIUM (NA)			1.9	2.4	2.47	1.9	2.4	2.39	2.2	
POTASSIUM (K)			1.1	1.1	1.3	1.0	1.0	0.95	0.84	
BICARBONATE AS CACO3 (LAB)			161.9	161.4	153.6	159.3	164.1	158.6		164
CARBONATE AS CO3 (LAB)			0.0	0.0	0	0.0	0.0	0		
SULFATE (SO4)			<10	<10	<10	<10	<10	<10		
CHLORIDE (CL)			0.6	0.8		0.4	0.9			7.1
FLUORIDE (F)									<0.1	
NUTRIENTS										
NITRATE (NO3-N)			0.010	0.072		0.017	0.099			
ORTHO-PHOSPHATE (PO4-P)									<0.005	
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.	0.002		<0.002	0.001	<0.005	<0.002	0.001	<0.005	0.001	
CADMIUM (CD) TOTAL REC.	0.0019	0.0013	0.0032	<0.002	<0.005	<0.0020	<0.002	<0.005	0.004	
CHROMIUM (CR) TOTAL REC.									<0.001	
COPPER (CU) TOTAL REC.	0.005	0.005	<0.003	<0.003	<0.005	<0.003	0.009	<0.005	0.002	
IRON (FE) TOTAL REC.									0.056	0.14
LEAD (PB) TOTAL REC.	0.016	0.023	0.025	0.013	0.007	0.045	0.006	0.008	0.012	0.019
MANGANESE (MN) TOTAL REC.	0.008								0.008	
MERCURY (HG) TOTAL REC.	0.00007	0.00035	<0.00002	<0.00002	<0.00002	<0.00002	0.00004	<0.00002	0.00013	
MOLYBDENUM (MO) TOTAL REC.			<0.003	<0.003	<0.005	<0.003	<0.003	<0.005	<0.001	
NICKEL (NI) TOTAL REC.									0.014	0.007
SELENIUM (SE) TOTAL REC.	<0.001								<0.001	
SILVER (AG) TOTAL REC.									<0.001	
SULFUR (S) TOTAL REC.										0.010
ZINC (ZN) TOTAL REC.	0.016	<0.01	<0.01	0.04	<0.005	<0.01	0.05	<0.005	<0.01	
OTHER PARAMETERS										
SILICA (SI)									93	130
CYANIDE (CN) TOTAL		0.003	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	0.008	0.004

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 09-17-19
HWQ-6/86-R1

SUMMARY OF SURFACE WATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME SAMPLE DATE LAB	BF #3 (STA #1) 05/01/86	BF #3 (STA #1) 10/30/86	BF #3 (STA #1) 01/02/87	BF #3 (STA #1) 04/15/87	BF #3 (STA #1) 07/16/87 SVL	BF #4 10/30/86	BF #4 01/02/87	BF #4 04/15/87	BF #4 07/16/87 SVL	BF #5 05/01/85
PHYSICAL PARAMETERS										
SPEC. COND. (UMHOS/CM) LAB					249				247	
PH FIELD						8.0				
PH LAB		8.2	8.4	7.733	7.9	8.2	8.1	7.693	8.0	
COMMON IONS										
TOTAL HARDNESS AS CACO3		215	167		176.3	208	170		175.7	
CALCIUM (CA)		40.0	45.6	49.48	47.7	37.0	46.3	44.61	47.6	
MAGNESIUM (MG)		27.8	12.9	14.09	13.9	28.0	13.2	12.82	13.8	
SODIUM (NA)		1.9	2.4	2.36	2.23	1.9	2.4	2.32	2.26	
POTASSIUM (K)		0.98	1.1	0.96	1.61	0.99	0.99	0.92	1.50	
BICARBONATE AS CACO3 (LAB)		159.3	157.7	156.6		159.0	160.9	138.5		
BICARBONATE (HCO3) (LAB)					149.6				152.5	
CARBONATE AS CO3 (LAB)		0.0	3.2	0	0	0.0	0.0	0	0	
SULFATE (SO4)		<10	<10	<10	5.7	<10	<10	<10	5.7	
CHLORIDE (CL)		0.4	0.8		<0.5	0.6	0.8		<0.5	
NUTRIENTS										
NITRATE (NO3-N)		0.010	0.054		<0.5	0.023	0.070		<0.5	
AMMONIA (NH3 AS N)					0.085				0.07	
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.	<0.001	0.003	0.001	<0.005	<0.004	<0.002	0.001	<0.005	<0.004	<0.001
CADMIUM (CD) TOTAL REC.	0.0022	0.0096	<0.002	<0.005	<0.002	0.0032	<0.002	<0.005	<0.002	0.0014
COPPER (CU) TOTAL REC.	0.004	<0.003	0.004	<0.005	<0.002	<0.003	0.004	<0.005	<0.002	0.005
IRON (FE) TOTAL REC.					<0.02				<0.02	
LEAD (PB) TOTAL REC.	0.013	<0.005	0.009	0.009	<0.003	0.020	0.013	0.007	<0.003	0.016
MANGANESE (MN) TOTAL REC.	0.006				<0.002				<0.002	0.006
MERCURY (HG) TOTAL REC.	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
MOLYBDENUM (MO) TOTAL REC.		<0.003	<0.003	0.006		<0.003	<0.003	0.016		
SELENIUM (SE) TOTAL REC.	<0.001				<0.003				<0.003	<0.001
SILVER (AG) TOTAL REC.					<0.002				<0.002	
ZINC (ZN) TOTAL REC.	0.010	<0.01	0.06	0.010	<0.002	<0.01	0.04	<0.005	<0.002	<0.01
OTHER PARAMETERS										
CYANIDE (CN) TOTAL		0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

SUMMARY OF SURFACE WATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	BF #5	BF #5	BF #5	LG #1	LG #1	LG #1	LG #1	LG #1	LG #1	LG #2
SAMPLE DATE	10/30/86	01/02/87	04/15/87	05/01/86	10/30/86	01/02/87	04/15/87	07/16/87	07/16/87	10/30/86
LAB								SVL	EL	
REMARKS									SPLIT	
PHYSICAL PARAMETERS										
SPEC. COND. (UMHOS/CM) LAB								199	54	
PH FIELD	8.0									9.0
PH LAB	8.2	8.3	7.983		8.3	8.4	7.600	8.7	8.2	8.3
TOTAL SUSP. SOLIDS									<1	
COMMON IONS										
TOTAL HARDNESS AS CACO3	208	151			215	126		144.0	139	215
CALCIUM (CA)	37.0	39.6	48.45		30.6	28.5	33.41	32.6	32	32.5
MAGNESIUM (MG)	28.0	12.6	14.24		31.1	13.3	15.73	15.2	15	32.2
SODIUM (NA)	1.8	2.3	2.20		1.1	1.4	1.40	1.28	<1	1.2
POTASSIUM (K)	0.97	1.1	0.94		0.70	0.73	0.71	1.19	1	0.66
BICARBONATE AS CACO3 (LAB)	157.2	158.3	151.0		140.3	134.0	116.9			143.5
BICARBONATE (HCO3) (LAB)								108.9	167	
CARBONATE AS CO3 (LAB)	0.0	0.0	0		0.0	3.2	0	12	0	0.0
SULFATE (SO4)	<10	<10	<10		<10	<10	<10	5.8	6	<10
CHLORIDE (CL)	0.5	0.8			0.3	1.1		<0.5	<1	0.3
NUTRIENTS										
NITRATE (NO3-N)	0.007	0.043			0.036	0.103		<0.5		0.049
NITRATE + NITRITE AS N									<0.05	
AMMONIA (NH3 AS N)								0.153	0.1	
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.	<0.002	0.001	<0.005	<0.001	<0.002	0.002	<0.005	<0.004	<0.005	<0.002
CADMIUM (CD) TOTAL REC.	0.0032	<0.002	<0.005	0.0014	<0.0020	<0.003	<0.0020	<0.002	0.001	<0.0020
COPPER (CU) TOTAL REC.	<0.003	0.004	<0.005	0.003	<0.003	0.004	0.004	<0.002	<0.01	<0.003
IRON (FE) TOTAL REC.								<0.02	0.07	
LEAD (PB) TOTAL REC.	<0.005	0.009	0.006	0.013	<0.005	0.016	<0.005	<0.003	<0.01	<0.005
MANGANESE (MN) TOTAL REC.				0.005				<0.002	<0.02	
MERCURY (HG) TOTAL REC.	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00050	<0.00002	<0.001	0.00007
MOLYBDENUM (MO) TOTAL REC.	<0.003	<0.003	<0.005		<0.003	<0.003	0.017			<0.003
SELENIUM (SE) TOTAL REC.				<0.001				<0.003	<0.005	
SILVER (AG) TOTAL REC.								<0.002	<0.005	
ZINC (ZN) TOTAL REC.	<0.01	0.07	<0.005	0.010	<0.01	0.01	0.03	<0.002	0.01	<0.01
OTHER PARAMETERS										
CYANIDE (CN) TOTAL	<0.002	<0.002	0.003		<0.002	<0.002	0.002	<0.002	<0.005	<0.002
CYANIDE (CN) WAD									<0.005	

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

SUMMARY OF SURFACE WATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	LG #2	LG #2	LG #2	LG #3	LG #3	LG #3	LG #3	LG #4	GH	STA #2
SAMPLE DATE	01/02/87	04/15/87	07/16/87	10/30/86	01/02/87	04/15/87	09/09/87	09/09/87	01/21/87	07/15/85
LAB			SVL				SVL	SVL		
REMARKS										BOG BY
REMARKS										RIVER
PHYSICAL PARAMETERS										
SPEC. COND. (UMHOS/CM) LAB			223				439	405		
PH FIELD				8.0						
PH LAB	8.5	7.754	8.5	8.3	8.3	7.779	7.8	7.7	8.2	6.6
COMMON IONS										
TOTAL HARDNESS AS CACO3	131		155.0	280	187		260	249	192	
CALCIUM (CA)	29.1	33.83	36.7	67.2	55.5	71.93	80.2	76.6	56.6	
MAGNESIUM (MG)	14.1	15.94	15.4	27.2	11.7	14.73	14.5	14.1	12.3	
SODIUM (NA)	1.4	1.38	1.24	1.9	2.3	1.85	2.5	1.7	1.1	
POTASSIUM (K)	0.69	0.68	1.16	1.6	1.5	2.2	2.3	2.3	0.74	
BICARBONATE AS CACO3 (LAB)	131.3	127.0		224.7	213.4	178.6	222.3	219.0	189.8	200
BICARBONATE (HCO3) (LAB)			128.5							
CARBONATE AS CO3 (LAB)	6.3	0	3	0.0	0.0	0	0	0	0.0	
SULFATE (SO4)	<10	<10	5.6	<10	<10	<10	6.18	3.50	<10	
CHLORIDE (CL)	0.7		<0.5	0.6	0.6		2.36	1.63	<0.5	9.4
NUTRIENTS										
NITRATE (NO3-N)	0.085		<0.5	0.019	0.042		0.253	0.234	0.056	
AMMONIA (NH3 AS N)			0.106				0.091	0.061		
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.	0.001	<0.005	<0.004	<0.002	<0.001	<0.005	<0.005	<0.005	<0.001	
CADMIUM (CD) TOTAL REC.	<0.002	0.0073	<0.002	0.0032	<0.002	<0.005	<0.002	<0.002	<0.002	
COPPER (CU) TOTAL REC.	0.004	0.008	<0.002	<0.003	0.004	0.007	<0.01	<0.01	<0.003	
IRON (FE) TOTAL REC.			<0.02				0.02	0.02		10.2
LEAD (PB) TOTAL REC.	0.016	0.006	<0.003	<0.005	0.019	0.090	0.002	0.002	0.010	0.024
MANGANESE (MN) TOTAL REC.			<0.002				<0.002	<0.002		
MERCURY (HG) TOTAL REC.	<0.00002	0.00018	<0.00002	<0.00002	<0.00002	<0.00002			0.00002	
MOLYBDENUM (MO) TOTAL REC.	<0.003	0.017		<0.003	<0.003	0.010				
NICKEL (NI) TOTAL REC.										0.019
SELENIUM (SE) TOTAL REC.			<0.003				<0.005	<0.005		
SILVER (AG) TOTAL REC.			<0.002				<0.007	<0.007		
ZINC (ZN) TOTAL REC.	<0.01	0.02	<0.002	<0.01	<0.01	0.063	0.031	<0.005	<0.01	
OTHER PARAMETERS										
SILICA (SI)										140
CYANIDE (CN) TOTAL	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.008	0.009	<0.002	0.004

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 09-17-1987
HWQ-6/86-R1

SUMMARY OF GROUNDWATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	T #1	T #2	T #2	T #2	T #2	T #3	T #3	T #3	T #3	AD
SAMPLE DATE	09/07/85	09/07/85	05/01/86	01/02/87	04/15/87	09/07/85	05/01/86	01/02/87	04/15/87	01/02/87
REMARKS			TURBID	TURBID			TURBID	TURBID		TURBID
REMARKS			SAMPLE	SAMPLE			SAMPLE	SAMPLE		SAMPLE
PHYSICAL PARAMETERS										
PH LAB	2.7	6.4		4.8	3.375	6.7		8.3	6.991	8.3
COMMON IONS										
TOTAL HARDNESS AS CACO3								192		147
CALCIUM (CA)				216.0	361.60			51.8	88.15	46.3
MAGNESIUM (MG)				154.1	410.71			15.3	22.77	7.7
SODIUM (NA)				5.1	5.67			0.57	4.31	5.3
POTASSIUM (K)				0.32	1.6			2.3	1.4	1.2
BICARBONATE AS CACO3 (LAB)				0.0	0.0			194.1	192.2	221.0
CARBONATE AS CO3 (LAB)				0.0	0			0.0	0	0.0
SULFATE (SO4)				1160	1931.5			22	42.4	<10
CHLORIDE (CL)				1.3				2.3		1.1
NUTRIENTS										
NITRATE (NO3-N)				0.020				0.021		0.017
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.	0.002	0.003	0.183	0.001	0.009	<0.001	0.014	0.001	<0.005	0.022
CADMIUM (CD) TOTAL REC.			1.1	0.230	0.6130		0.0170	<0.002	0.0583	<0.002
COPPER (CU) TOTAL REC.	28.2	0.001	7.8	0.423	2.7	0.002	0.14	0.014	0.25	0.014
LEAD (PB) TOTAL REC.	0.12	0.028	16.3	0.116	0.059	0.018	0.23	0.013	0.112	0.056
MANGANESE (MN) TOTAL REC.			153.2				6.9			
MERCURY (HG) TOTAL REC.	0.00062	0.00014	0.00623	0.00007	0.00018	0.00022	<0.00002	0.00002	0.00054	0.00004
MOLYBDENUM (MO) TOTAL REC.				<0.003	0.271			<0.003	0.028	<0.003
SELENIUM (SE) TOTAL REC.			0.0013				<0.001			
ZINC (ZN) TOTAL REC.			316.0	55.0	209.0		8.1	0.76	13.8	0.08
OTHER PARAMETERS										
CYANIDE (CN) TOTAL	0.016	0.020		<0.002	0.008	0.009		<0.002	0.003	<0.002

quantities in milligrams per liter unless otherwise noted. nk line indicates parameter not tested. Output Date: 09-

SUMMARY OF GROUNDWATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	AD	AD	AD	BD	BD	20B	20B	BMW-87-A	BMW-87-B	BMW-87-C
SAMPLE DATE	04/15/87	09/09/87	09/09/87	01/02/87	04/15/87	01/02/87	04/15/87	09/08/87	09/08/87	09/08/87
LAB		SVL	SVL					SVL	SVL	SVL
REMARKS			DUPLICATE	TURBID						
REMARKS				SAMPLE						
PHYSICAL PARAMETERS										
SPEC. COND. (UMHOS/CM) LAB		357	345					421	400	215
PH LAB	6.779	7.1	7.1	6.3	6.126	7.6	7.695	7.2	7.3	8.0
COMMON IONS										
TOTAL HARDNESS AS CACO3		215	216	281				233.7	228.3	37.1
CALCIUM (CA)	53.65	67.2	67.6	55.8	14.81	86.8	70.27	77.8	77.4	13.7
MAGNESIUM (MG)	7.93	11.5	11.5	34.5	1.73	14.6	11.19	9.58	8.50	0.706
SODIUM (NA)	3.97	4.8	4.8	8.3	5.94	2.0	1.55	2.53	2.21	32.1
POTASSIUM (K)	1.5	13.0	8.3	20.5	2.2	3.3	1.6	1.96	2.21	1.43
BICARBONATE AS CACO3 (LAB)	167.0	166.6	165.6	33.2	31.1	220.3	171.6	213.8	210.8	105.8
CARBONATE AS CO3 (LAB)	0	0	0	0.0	0	0.0	0	0	0	0
SULFATE (SO4)	<10	7.90	7.64	32	<10	<10	<10	5.87	6.17	7.00
CHLORIDE (CL)		10.4	5.85	1.2		<0.5		3.07	0.693	1.09
NUTRIENTS										
NITRATE (NO3-N)		0.268	0.455	0.004		<0.02		0.566	0.554	<0.2
AMMONIA (NH3 AS N)		0.076	0.087					0.061	0.151	0.507
TRACE ELEMENTS										
ARSENIC (AS) DISS		0.022	0.022					<0.005	<0.005	0.006
ARSENIC (AS) TOTAL REC.	0.067			0.155	0.195	0.030	0.058			
CADMIUM (CD) DISS		<0.002	0.002					<0.002	<0.002	<0.002
CADMIUM (CD) TOTAL REC.	0.0030			<0.002	<0.005	<0.0020	<0.005			
COPPER (CU) DISS		<0.01	<0.01					<0.005	<0.005	<0.005
COPPER (CU) TOTAL REC.	0.008			0.127	0.006	0.022	0.006			
IRON (FE) DISS		0.011	0.019					0.061	0.065	0.086
LEAD (PB) DISS		0.017	0.052					<0.005	<0.005	0.007
LEAD (PB) TOTAL REC.	0.013			0.093	0.040	0.032	0.030			
MANGANESE (MN) DISS		<0.002	<0.002					0.001	0.004	0.017
MERCURY (HG) DISS								<0.00015	<0.00015	<0.00015
MERCURY (HG) TOTAL REC.	0.00052			0.00082	0.00027	0.00006	<0.00002			
MOLYBDENUM (MO) TOTAL REC.	0.016			<0.003	0.014	<0.003	<0.005			
SELENIUM (SE) DISS		<0.005	<0.005					<0.005	<0.005	<0.005
SILVER (AG) DISS		<0.007	<0.007					<0.005	<0.005	<0.005
ZINC (ZN) DISS		0.073	0.042					0.087	0.021	0.014
ZINC (ZN) TOTAL REC.	0.04			0.13	0.019	0.07	0.017			
OTHER PARAMETERS										
CYANIDE (CN) TOTAL	0.002	0.008	0.013	<0.002	<0.002	<0.002	0.002			
CYANIDE (CN) WAD								0.003	0.002	0.002

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 09-17-1987
HWQ-6/86-R1

SUMMARY OF GROUNDWATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	BMW-87-D	BMW-87-E	BMW-87-32	BMW-87-39
SAMPLE DATE	09/08/87	09/08/87	09/08/87	09/08/87
LAB	SVL	SVL	SVL	SVL
PHYSICAL PARAMETERS				
SPEC. COND. (UMHOS/CM) LAB	276	336	321	274
PH LAB	7.7	7.5	7.4	7.4
COMMON IONS				
TOTAL HARDNESS AS CACO3	133.8	180.5	167.4	151.8
CALCIUM (CA)	40.3	50.7	44.6	42.5
MAGNESIUM (MG)	8.06	13.1	13.6	11.1
SODIUM (NA)	8.85	2.29	4.58	3.51
POTASSIUM (K)	1.11	0.76	2.23	1.66
BICARBONATE AS CACO3 (LAB)	142.5	172.1	159.6	134.5
CARBONATE AS CO3 (LAB)	0	0	0	0
SULFATE (SO4)	3.97	6.23	8.90	6.94
CHLORIDE (CL)	1.14	0.697	1.94	0.860
NUTRIENTS				
NITRATE (NO3-N)	<0.2	0.605	0.938	0.516
AMMONIA (NH3 AS N)	0.151	0.094	0.403	0.341
TRACE ELEMENTS				
ARSENIC (AS) DISS	0.025	0.007	<0.005	0.005
CADMIUM (CD) DISS	<0.002	<0.002	<0.002	<0.002
COPPER (CU) DISS	<0.005	<0.005	<0.005	<0.005
IRON (FE) DISS	0.245	0.069	0.074	0.070
LEAD (PB) DISS	0.016	0.013	<0.005	0.028
MANGANESE (MN) DISS	0.038	<0.001	0.005	<0.001
MERCURY (HG) DISS	<0.00015	<0.00015	<0.00015	<0.00015
SELENIUM (SE) DISS	<0.005	<0.005	<0.005	<0.005
SILVER (AG) DISS	<0.005	<0.005	<0.005	<0.005
ZINC (ZN) DISS	0.478	0.036	0.041	0.022
OTHER PARAMETERS				
CYANIDE (CN) WAD	0.003	0.009	0.005	0.006

quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 09-17-

SUMMARY OF DOMESTIC GROUNDWATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	BA	BA	BA	NA	NA	RV	RV	RV	DFH	DFH
SAMPLE DATE	10/30/86	01/02/87	04/15/87	10/30/86	04/15/87	10/30/86	01/02/87	04/15/87	10/30/86	01/02/87
PHYSICAL PARAMETERS										
PH FIELD	7.0			7.0		9.0			7.0	
PH LAB	6.9	7.8	6.623	8.2	7.296	8.3	8.5	8.585	7.4	7.4
COMMON IONS										
TOTAL HARDNESS AS CACO3	282	215		256		8			69	64
CALCIUM (CA)	58.0	59.5	55.81	47.8	48.41	2.9	3.8	2.80	22.9	22.5
MAGNESIUM (MG)	33.5	16.2	16.38	33.2	15.01	0.20	0.19	<0.10	2.8	1.9
SODIUM (NA)	2.3	2.5	2.62	2.5	2.77	51.0	67.9	99.94	24.0	24.8
POTASSIUM (K)	0.90	0.93	0.85	0.83	0.71	0.87	1.0	0.74	1.3	1.3
BICARBONATE AS CACO3 (LAB)	200.7	209.7	193.7	181.5	149.6	181.5	178.9	162.1	126.5	112.9
CARBONATE AS CO3 (LAB)	0.0	0.0	0	0.0	0	0.0	5.3	10	0.0	0.0
SULFATE (SO4)	<10	<10	<10	<10	<10	17	20	13.5	<10	10
CHLORIDE (CL)	0.7	1.0		0.9		1.9	2.2		1.0	1.0
NUTRIENTS										
NITRATE (NO3-N)	0.184	0.356		0.268		0.077	0.055		0.100	0.162
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.	<0.001	0.001	<0.005	<0.001	<0.005	0.001	0.002	<0.005	<0.001	0.001
CADMIUM (CD) TOTAL REC.	<0.0020	<0.002	0.0291	0.0064	<0.0020	<0.0020	<0.002	0.0030	0.0032	<0.002
COPPER (CU) TOTAL REC.	0.008	0.018	0.016	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
LEAD (PB) TOTAL REC.	0.005	0.019	<0.005	0.025	0.018	0.020	0.013	0.009	<0.005	0.016
MERCURY (HG) TOTAL REC.	<0.00002	<0.00002	0.00010	0.00005	0.00052	0.00007	<0.00002	0.00020	0.00005	<0.00002
MOLYBDENUM (MO) TOTAL REC.	<0.003	<0.003	0.016	<0.003	0.016	<0.003	<0.003	0.015	<0.003	<0.003
ZINC (ZN) TOTAL REC.	<0.01	0.12	0.01	0.14	<0.01	<0.01	<0.01	<0.01	0.16	0.26
OTHER PARAMETERS										
CYANIDE (CN) TOTAL	<0.002	<0.002	0.002	0.013	0.002	<0.002	<0.002	0.002	<0.002	<0.002

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 07-17-1987
HWQ-6/86-R1

SUMMARY OF DOMESTIC GROUNDWATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	DPB	DPB	DPB	LD	LD	LD	LD	RO	RO	RO
SAMPLE DATE	04/15/87	10/30/86	01/02/87	10/30/86	01/02/87	01/02/87	04/15/87	10/30/86	01/02/87	04/15/87
PHYSICAL PARAMETERS										
PH FIELD		7.5		6.5				7.0		
PH LAB	6.869	8.0	8.2	7.1	8.1	8.2	6.924	8.1	8.1	7.650
COMMON IONS										
TOTAL HARDNESS AS CACO3		234	183	140	168	118		253		
CALCIUM (CA)	25.25	60.4	57.6	49.0	43.0	42.8	51.09	43.7	38.1	43.09
MAGNESIUM (MG)	2.20	20.2	9.6	4.4	14.7	2.7	3.39	34.7	14.9	15.90
SODIUM (NA)	26.23	2.2	2.6	27.3	2.7	21.7	25.69	2.3	2.5	2.51
POTASSIUM (K)	1.1	1.3	1.3	3.0	0.83	3.0	2.7	0.85	0.87	0.81
BICARBONATE AS CACO3 (LAB)	107.4	215.7	208.4	137.4	176.7	148.8	134.6	180.4	166.7	154.1
CARBONATE AS CO3 (LAB)	0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
SULFATE (SO4)	57.6	<10	<10	65	<10	42	46.6	<10	<10	<10
CHLORIDE (CL)		0.7	0.8	0.9	1.0	1.1		0.3	0.6	
NUTRIENTS										
NITRATE (NO3-N)		0.107	0.085	0.007	0.229	0.025		0.072	0.089	
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.	<0.005	<0.001	<0.001	0.003	0.001	0.002	0.007	<0.001	<0.001	<0.005
CADMIUM (CD) TOTAL REC.	0.0146	<0.0020	<0.002	<0.0020	<0.002	<0.002	0.0030	0.0096	<0.002	0.0109
COPPER (CU) TOTAL REC.	<0.003	<0.003	<0.003	<0.003	0.009	<0.003	<0.003	<0.003	<0.003	<0.003
LEAD (PB) TOTAL REC.	<0.005	0.030	0.016	<0.005	0.013	0.007	<0.005	0.020	0.013	0.011
MERCURY (HG) TOTAL REC.	0.00088	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	0.00030	0.00005	<0.00002	0.00016
MOLYBDENUM (MO) TOTAL REC.	0.016	<0.003	<0.003	<0.003	<0.003	<0.003	0.014	<0.003	<0.003	0.018
ZINC (ZN) TOTAL REC.	0.25	<0.01	1.4	<0.01	0.22	0.01	0.01	0.03	0.05	<0.01
OTHER PARAMETERS										
CYANIDE (CN) TOTAL	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

quantities in milligrams per liter unless otherwise noted.   ank line indicates parameter not tested.   Output Date: 09-

SUMMARY OF DOMESTIC GROUNDWATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME	DH	EW	EW
SAMPLE DATE	10/30/86	01/02/87	04/15/87
PHYSICAL PARAMETERS			
PH FIELD	8.0		
PH LAB	8.1	8.7	8.065
COMMON IONS			
TOTAL HARDNESS AS CACO3	161		
CALCIUM (CA)	31.3	3.0	2.13
MAGNESIUM (MG)	20.0	0.15	0.17
SODIUM (NA)	36.6	60.3	91.08
POTASSIUM (K)	0.99	1.2	0.39
BICARBONATE AS CACO3 (LAB)	175.1	164.1	166.6
CARBONATE AS CO3 (LAB)	0.0	11.6	0
SULFATE (SO4)	<10	<10	<10
CHLORIDE (CL)	0.4	1.0	
NUTRIENTS			
NITRATE (NO3-N)	0.085	0.111	
TRACE ELEMENTS			
ARSENIC (AS) TOTAL REC.	<0.001	0.005	0.018
CADMIUM (CD) TOTAL REC.	0.0128	<0.002	0.0182
COPPER (CU) TOTAL REC.	<0.003	<0.003	<0.003
LEAD (PB) TOTAL REC.	0.015	0.009	0.008
MERCURY (HG) TOTAL REC.	0.00007	<0.00002	0.00024
MOLYBDENUM (MO) TOTAL REC.	<0.003	<0.003	0.015
ZINC (ZN) TOTAL REC.	<0.01	<0.01	<0.01
OTHER PARAMETERS			
CYANIDE (CN) TOTAL	<0.002	<0.002	<0.002

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 09-17-1987
HWQ-6/86-R1

SUMMARY OF MINE ADIT WATER QUALITY ANALYSES - BIG BLACKFOOT PROJECT

SITE NAME SAMPLE DATE	STA #3 (#1 ADIT) 06/21/85	STA #3 (#1 ADIT) 07/15/85	STA #3 (#1 ADIT) 05/01/86	STA #3 (#1 ADIT) 04/15/87	STA #4 (#3 ADIT) 06/21/85	STA #4 (#3 ADIT) 07/15/95	STA #4 (#3 ADIT) 08/28/86	STA #4 (#3 ADIT) 10/30/86	STA #4 (#3 ADIT) 04/15/87
PHYSICAL PARAMETERS									
PH FIELD								7.0	
PH LAB	7.2	7.4		7.707	6.9	7.2	6.7	7.6	7.398
COMMON IONS									
TOTAL HARDNESS AS CACO3	83				162			353	
CALCIUM (CA)	12.6			43.78	26.2			57.0	64.38
MAGNESIUM (MG)	12.5			13.83	23.6			50.7	27.73
SODIUM (NA)	7.5			4.98	4.5			4.3	5.30
POTASSIUM (K)	2.2			2.0	5.0			3.7	8.7
BICARBONATE AS CACO3 (LAB)		170		150.0		252		240.0	219.8
CARBONATE AS CO3 (LAB)				0				0.0	0
SULFATE (SO4)				<10				26	46.8
CHLORIDE (CL)		6.3				7.9		1.5	
FLUORIDE (F)	<0.1				<0.1				
NUTRIENTS									
NITRATE (NO3-N)								0.098	
ORTHO-PHOSPHATE (PO4-P)	0.03				0.07				
TRACE ELEMENTS									
ARSENIC (AS) TOTAL REC.	<0.001		<0.001	<0.005	0.002			<0.001	<0.005
CADMIUM (CD) TOTAL REC.	0.0002		0.0024	<0.0020	0.0014		0.0005	<0.0020	0.0146
CHROMIUM (CR) TOTAL REC.	<0.001				<0.001				
COPPER (CU) TOTAL REC.	0.004		0.047	0.013	0.008		0.008	<0.003	0.008
IRON (FE) DISS						0.97			
IRON (FE) TOTAL REC.	0.052	0.13			3.8				
LEAD (PB) DISS						0.020			
LEAD (PB) TOTAL REC.	0.016	0.022	0.019	<0.005	0.056		0.026	0.030	0.009
MANGANESE (MN) TOTAL REC.	0.002		0.002		0.51				
MERCURY (HG) TOTAL REC.	0.00013		<0.00002	0.00396	0.00042		0.00073	0.00010	0.00034
MOLYBDENUM (MO) TOTAL REC.	<0.001			0.016	<0.001			<0.003	0.018
NICKEL (NI) DISS						0.012			
NICKEL (NI) TOTAL REC.	0.023	0.011			0.036				
SELENIUM (SE) TOTAL REC.	<0.001		<0.001		<0.001				
SILVER (AG) TOTAL REC.	<0.001				<0.001				
ZINC (ZN) TOTAL REC.	<0.01		0.027	<0.01	<0.01		<0.01	<0.01	<0.01
OTHER PARAMETERS									
SILICA (SI)	240	230			173	150			
CYANIDE (CN) TOTAL	0.015	0.006	<0.001	0.003	0.005	0.004	0.003	<0.002	<0.002

12340000 BLACKFOOT RIVER NEAR BONNER, MT--Continued

WATER-QUALITY RECORDS

PERIODS OF RECORD.--Water years 1956-59, 1982 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS) (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	PH (STANDARD UNITS) (00400)
OCT								
11...	12:30	617	--	--	263	10.0	9.0	--
NOV								
28...	12:15	581	--	--	256	2.0	0.5	--
JAN								
15...	13:15	512	--	--	257	0.5	0.0	--
MAR								
05...	09:30	472	--	--	270	1.5	0.0	--
28...	15:15	535	--	1	262	12.0	5.0	8.4
APR								
12...	13:40	1420	50	1	190	10.5	10.0	8.2
16...	14:00	2440	--	--	176	21.0	8.0	--
23...	15:00	2410	50	1	172	5.5	5.5	8.0
MAY								
03...	12:00	4300	100	2	160	13.0	9.0	8.2
21...	17:15	5150	30	1	150	22.0	12.5	8.2
31...	11:30	4720	5	1	170	11.5	8.5	8.3
JUN								
25...	09:50	1460	--	--	205	10.5	13.0	--
AUG								
13...	10:00	657	--	--	244	9.0	11.5	--

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)
MAR									
28...	15:15	<1	<1	<1	<1	8	3	210	15
APR									
12...	13:40	1	<1	1	<1	10	3	710	48
23...	15:00	<1	<1	<1	<1	5	4	230	22
MAY									
03...	12:00	<1	<1	1	<1	10	4	570	15
21...	17:15	<1	<1	1	<1	12	5	950	10
31...	11:30	12	<1	1	<1	9	4	440	15

DATE	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR									
28...	15	2	40	4	10	<3	3	4.3	53
APR									
12...	17	5	40	5	<10	7	31	119	89
23...	15	7	20	<1	10	8	8	52	82
MAY									
03...	17	<1	40	5	20	8	32	372	81
21...	15	8	60	<1	20	12	71	937	85
31...	10	4	30	<1	20	15	27	344	89

FROM: U.S. Geological Survey

Chen-Northern, Inc.

A member of the HIH group of companies

600 SOUTH 25TH STREET
P. O. BOX 30615
BILLINGS, MT 59107
(406) 248-9161
FAX (406) 248-9282

OLD TAILS
444-1923

TECHNICAL REPORT

Big Blackfoot Tails
Lincoln, MT

*Revised: 7/20/90
DATE: July 18, 1990
JOB NUMBER: 87-911-10
SHEET: 1 OF 2
INVOICE NO.: 96164

REPORT TO:
CHEN-NORTHERN, INC.
ATTN: MR. TERRY GROTBO
P O BOX 4699
HELENA, MT 59601

REPORT OF: Solid Waste Analysis - Inland Gold (88-3008)

Sample Identification:

On July 3, 1990, this sample of tailings was delivered to our laboratory for analysis. Three samples were composited into one sample. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986. The results of the analysis are as follows.

A < sign indicates less than the reported value was present in the sample.

Lab No.:	105350	
Sample Description:	Tailings	
Date Sampled:	None Given	
Collected by:	Terry Grotbo	Date Analyzed
all in mg/l	EP Toxicity	
Arsenic as As	0.010	7/13/90
Barium as Ba	<0.1	7/10/90
Cadmium as Cd	0.029	7/10/90
Chromium as Cr	0.02	7/10/90
Lead as Pb	1.50	7/10/90
Mercury as Hg	<0.001	7/13/90
Selenium as Se	<0.015	7/12/90
Silver as Ag	0.02	7/10/90

*EP Toxicity reported on page 1 and TCLP reported on page 2.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF OUR CLIENTS AND AUTHORIZATION FC PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL. SAMPLES WILL BE DISPOSE OF AFTER TESTING IS COMPLETED UNLESS OTHER ARRANGEMENTS ARE AGREED TO IN WRITING.

SOLID WASTE ANALYSIS
INLAND GOLD (88-3008)
CHEN-NORTHERN, INC. - HELENA, MT

July 18, 1990
Job No. 8-911-10
Sheet 2 of 2

Lab No.:	105350	
Sample Description:	Tailings	
Date Sampled:	None Given	Date
Collected by:	Terry Grotbo	Analyzed
all in mg/l	Toxicity Characteristic Leachate Procedure (TCLP)	
Arsenic as As	<0.005	7/13/90
Barium as Ba	0.1	7/10/90
Cadmium as Cd	0.020	7/10/90
Chromium as Cr	<0.02	7/10/90
Lead as Pb	26.9	7/10/90
Mercury as Hg	<0.001	7/13/90
Selenium as Se	<0.015	7/12/90
Silver as Ag	<0.02	7/10/90

Reviewed by

rmr

MARYSVILLE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BALD MOUNTAIN PA#: 25-061

Date: August 19, 1993 Time: 1310

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (70°F); clear; slight breeze (0-5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #5: Mill building; #6: WR-2; #7: TP-2A and -2B; #8: TP-2A and -2B. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is reached by driving through and on the Great Divide Ski Area.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Waste rock can be revegetated; topsoil and seed tailings and recontour to get out gullies.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BALD MOUNTAIN PA#: 25-061

Legal Description: T 12N ;R 6W ;Sec. 35 , NE1/4SW 1/4 1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 44' 55" Longitude: W 112° 19' 15"

Primary Drainage Basin and Code: Silver Creek/10030101
Secondary Drainage Basin: Jennies Fork

USGS Quadrangle map name(s): Greenhorn Mountain

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): James Salisbury, The Thomas Cruse Mining & Dev., 704 Parkview, Missoula, MT 59803. (406) 442-1576.

Relationship to other mines/sites in the area/district: The Belmont Millsite is located across ridge to the southwest. Belmont Mine was worked through a Bald Mountain Mine adit.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6300', Slope Up to 38°, Aspect South

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 7 acres.
Dimensions:

Predominant vegetation types: Mullen, grasses, thistle, pine

Access: roads - good___,poor___,4wd X ,trail X .
Other logistical considerations (proximity to other sites). Must hike to upper workings; 4WD to the rest.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 37 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Jennies Fork begins east of the site and flows for 1.25 miles before draining into Silver Creek.

Mining/milling history, ore type/tenor, host rock, gangue: The site is also identified as the Cruse Mine. The site was listed as the most active property in the area in 1911. A 20-stamp mill was present on the property with 70% of the Au and Ag being recovered on the plates and the tailings going directly to a cyanide plant. Mine was at contact of granite and hornstones. Gangue minerals were quartz with manganferous calcite. Ore is tetrahedrite, chalcopyrite, pyrite, and galena.

Mine Operation?
Shafts - Yes X, No ___, # 4, Comment Fenced with barb-wire
Adits - Yes X, No ___, # 2, Comment Collapsed
Pits - Yes ___, No ___, # ___, Comment ___
Placers - Yes ___, No ___, # ___, Comment ___
Other - Yes ___, No ___, # ___, Comment ___

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: Reported as the most active mine in the area in 1911.

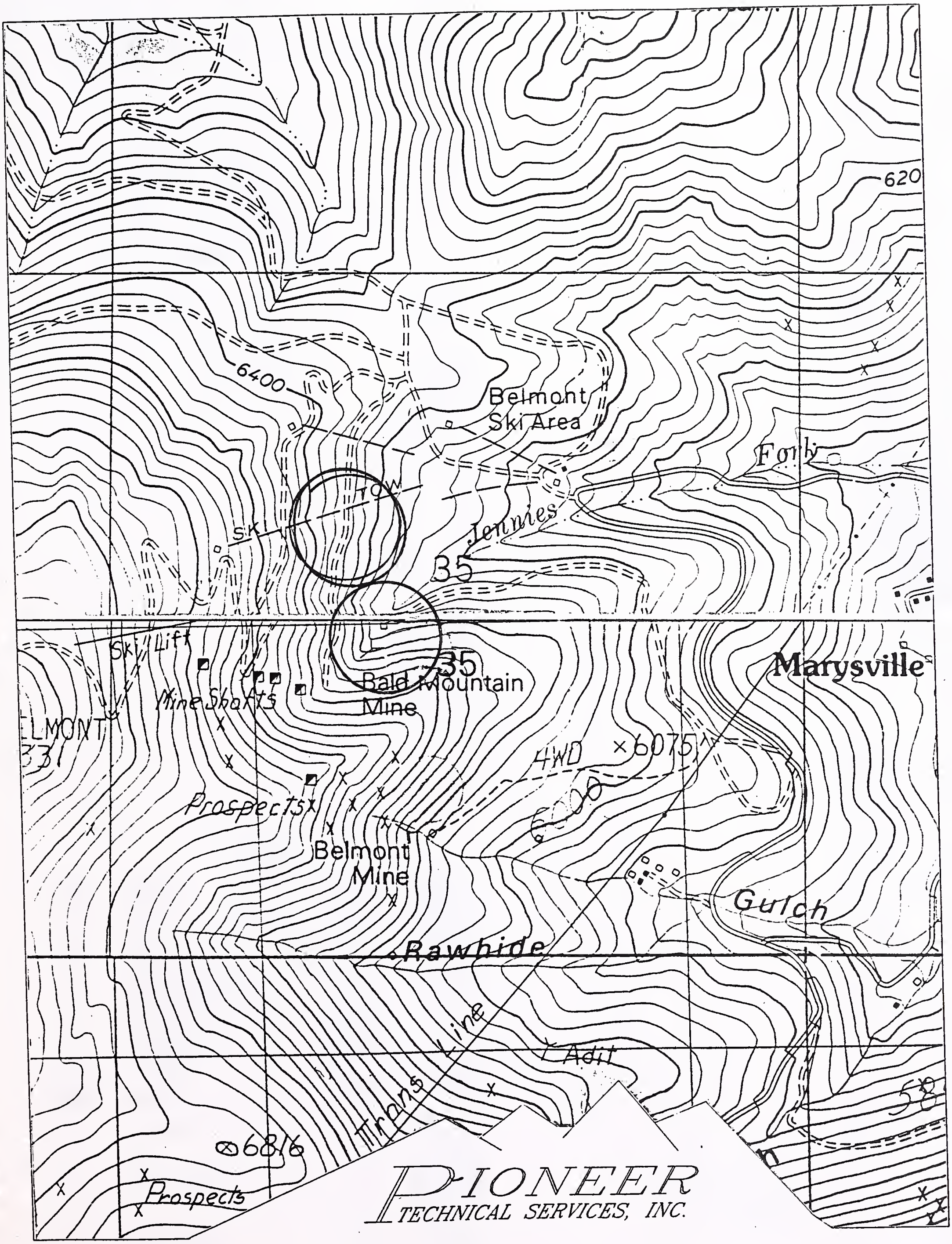
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: West Belmont Mine

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? 20-stamp mill reported on property appears to be same process as at Belmont; quartz separation (gravity concentration) and tailings went directly to cyanide plant.

Montana Bureau of Mines and Geology
Water Well Log Data

11/01/1993

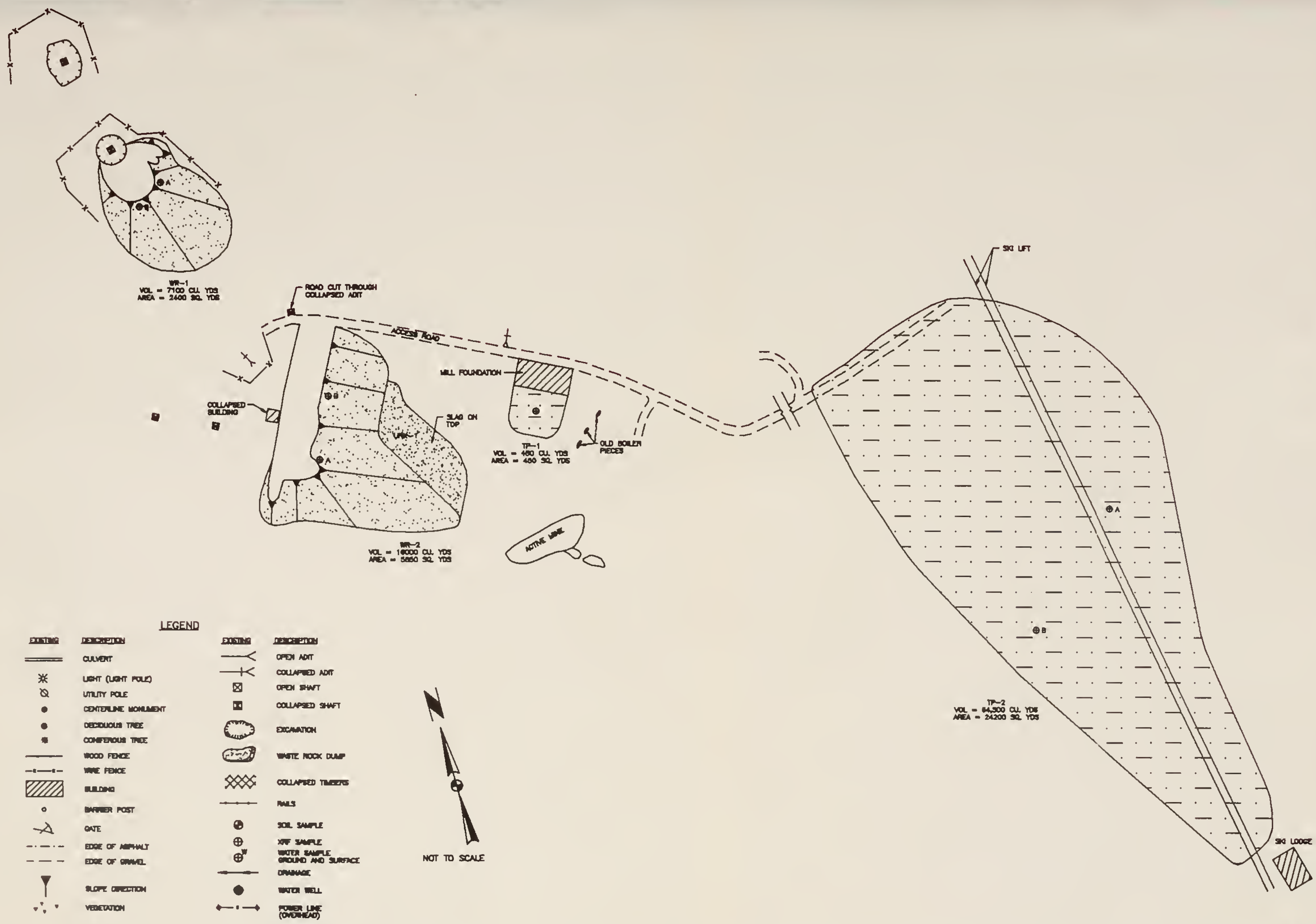
Well No.	Location	Depth	Yield	Static Water Level
M:66433	12N 06W 35	84.0	20.0	15.00
M:66434	12N 06W 35 ADB	120.0	15.0	20.00
M:66435	12N 06W 35 DDB	50.0	1.0	27.00
M:66436	12N 06W 35 DDB	50.0	0.0	0.00
M:66437	12N 06W 35 DDBC	0.0	60.0	75.00
M:66439	12N 06W 36	0.0	20.0	Flowing
M:66447	12N 06W 36	55.0	25.0	10.00
M:66443	12N 06W 36	0.0	0.0	0.00
M:66451	12N 06W 36	35.0	1.0	20.00
M:66445	12N 06W 36	55.0	25.0	11.00
M:66455	12N 06W 36	70.0	20.0	15.00
M:66449	12N 06W 36	45.0	25.0	0.00
M:66441	12N 06W 36	35.0	35.0	20.00
M:66440	12N 06W 36	50.0	0.0	20.00
M:66457	12N 06W 36	25.0	0.0	0.00
M:66448	12N 06W 36	32.0	30.0	8.00
M:66453	12N 06W 36	50.0	20.0	15.00
M:66438	12N 06W 36	52.0	38.0	25.00
M:66444	12N 06W 36	55.0	30.0	5.00
M:66452	12N 06W 36	25.0	0.0	20.00
M:66446	12N 06W 36	155.0	3.0	8.00
M:66442	12N 06W 36	35.0	35.0	20.00
M:66456	12N 06W 36	120.0	10.0	25.00
M:66450	12N 06W 36	12.0	0.0	0.00
6454	12N 06W 36	70.0	20.0	15.00
66458	12N 06W 36 A	25.0	0.0	0.00
M:66459	12N 06W 36 BACC	0.0	35.0	20.00
M:66460	12N 06W 36 BACC	25.0	35.0	20.00
M:66461	12N 06W 36 BD	200.0	1.0	58.00
M:121418	12N 06W 36 BDB	110.0	6.0	0.00
M:66462	12N 06W 36 BDB	160.0	10.0	40.00
M:66463	12N 06W 36 BDC	86.0	15.0	30.00
M:66465	12N 06W 36 BDC	100.0	20.0	15.00
M:66464	12N 06W 36 BDC	60.0	20.0	15.00
M:127905	12N 06W 36 CA	80.0	20.0	25.00
M:66466	12N 06W 36 DB	105.0	10.0	46.00
M:66467	12N 06W 36 DB	105.0	20.0	63.00



PIONEER TECHNICAL SERVICES, INC.

BALD MOUNTAIN, P.A. NO. 25-061

T12N, R06W, SECTION 35
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BALD MOUNTAIN PA# 25-061
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

PIONEER

DRAWN MWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TD&H
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

25-061.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Fine sand

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): TP-1, at mill, is 3 feet deep; TP-2, at ski lodge area, is 11 feet deep at deepest location.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Partial from 0 to 8 feet; moist beginning at 8 feet.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Tailings are flumed from mill to ski lodge area; no impoundment seen.

Comments on potential for mitigation: Recontour and revegetate

SOURCE INVENTORY FORM

SAMPLERS: Babits, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)[*]	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	7,100	North side of WR-1	None	7.0 (D)	0.02	25-061-WR-1	08/20/93 1400	T-Metals, ABA
WR-1B	WR		South side of WR-1	None	6.45 (D)	0.04			
WR-2A	WR	16,000	South side of WR-2	None	6.8 (D)	0.04			
WR-2B	WR		North side of WR-2	None	6.8 (D)	0.04			
TP-1A	TAIL	450	30' south of mill foundation; 0-1'	None	6.8 (D)	0.04	25-061-TP-1	08/20/93 1400	T-Metals, ABA
TP-1B	TAIL		30' south of mill foundation; 1-3'	None	7.0 (D)	0.04			
TP-2A-A	TAIL	64,500	North side of ski lodge tailings area; 0-1'	None	6.8 (D)	0.04			
TP-2A-B	TAIL		North side of ski lodge tailings area; 1-4'	None	6.8 (D)	0.04			
TP-2A-C	TAIL		North side of ski lodge tailings area; underlying soil	None	6.3 (D)	0.05			
TP-2B-A	TAIL		South side of ski lodge tailings area; 0-8'	None	7.0 (D)	0.04			
TP-2B-B	TAIL		South side of ski lodge tailings area; 8-11'	None	6.8 (D)	0.04	25-061-TP-2	08/20/93 1405	T-Metals, ABA
TP-2B-C	TAIL		South side of ski lodge tailings area; 11-12'	None	6.6 (D)	0.04			
UNK-1	OTH	ND	Unknown sample by power pole	None	NM	NM	N/A	N/A	XRF Analysis

[*] D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-061-WR-1 is composite of WR-1A and -1B, and WR-2A and -2B. 25-061-TP-1 is composite of TP-1A and -1B, and TP-2A-A through -2A-C, and TP-2B-A. 25-061-TP-2 is composite of TP-2B-B and -2B-C. ND = Not Determined; NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_317___

Distance to nearest well used for drinking?_0.25 mile (ski lodge)___

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Uncontained source with groundwater at Marysville as shallow as 20 feet; however, metal values are low.

Other observations/notes:_N/A___

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes X , No____, Name(s)/Description: Mine discharge from the Gulf Titanium flows north.

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:________, Average Flow:________

Distance between waste source(s) and nearest surface water body (ft)?
125 feet between site and Gulf Titanium's mine discharge.

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes X , No____, Distance downstream (ft)? 0.5 mi Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Gulf Titanium active mine discharge is very turbid.

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 0 acres

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 0.25 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Moist/Dry	21,600	21,600	Yes	Low
WR-2	None	Partial	50,850	50,850	Yes	Low
TP-1	None	Dry	4,050	4,050	Yes	Moderate/High
TP-2	None	Partial	217,800	217,800	Yes	Moderate/High
UNK-1	None	Dry	ND	100% vegetated	Yes	None

Notes and Clarifications: ND = Not Determined

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes X , No_____, Describe: Gulf Titanium workers

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____; Comments__________

Evidence of recreational use on site: Yes X , No____, Describe: Ski lift

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X , Comment__________
Wilderness Area - Yes____, No X , Comment__________
T&E Species Habitat - Yes____, No X , Comment__________
Bat Habitat - Yes____, No X , Comment__________

Primary Drainage X ; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X , Low____
Wetlands Frontage - High____, Medium X , Low____
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No____, Number 4 , types and locations: Shafts collapsed, but deep enough that it would be difficult to get out of if someone were to fall in.

Hazardous structures: Yes____, No X , Number_____, types and locations:__________

Unstable highwalls, pits, trenches, slopes: Yes____, No X , Number_____, types and locations:__________

Unstable waste piles, impoundments, undercut banks: Yes_____, No X , Number_____, types and locations:__________

Fire and/or Explosion hazards: Yes____, No X , Explain:__________

Bibliography

Chen-Northern, Letter from Michael Cormies to Ed Gensler, MDSL/AMRB, October 16, 1989.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Bald Mountain Mine, Prepared by Northern Engineering and Testing, July 7 and 8, 1988.

Robert Peccia and Associates, Letter from Michelle Marsh to Ed Gensler, MDSL/AMRB, October 16, 1989.

USGS, Geology of Marysville Mining District, Montana, Professional Paper 57, Author Unknown, 1903.

USGS, Ore Deposits of the Helena Mining Region, Montana, Bulletin 527, Written by Adolph Knopf, 1913.

USGS, Topographic Map, Greenhorn Mountain, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

BALD MOUNTAIN
PA NO. 25-061

Bald Mountain PA# 25−061
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 08/19/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−061−TP−1	14.3	50.4	0.9 UJ	3.62 J	5.94 J	79.1	9450	0.523	2200	4.55 J	142	6.37 U	256	NR
25−061−TP−2	16.5	117	1.0 UJ	3.68 J	3.73 J	56.4	9870	0.964	1810	4.72 J	84.5	9.83	158	NR
25−061−WR−1	48.8	64.7	0.7 UJ	6.81 J	5.51 J	36.6	14200	0.324	994	7.37 J	41.7	4.7 U	125	NR
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25−061−TP−1	0.07	2.19	38.7	36.6	0.03	0.01	0.03	0.31	38.4
25−061−TP−2	0.01	0.31	60.1	59.8	<0.01	0.01	0.01	0.31	59.8
25−061−TP−2DUP	<0.01	0	60.3	60.3	<0.01	0.01	0.01	0.31	60
25−061−WR−1	0.02	0.62	57.9	57.2	<0.01	<0.01	0.03	0	57.9

LEGEND

TP1 − Composite of subsamples TP1A, 1B, 2A−A, 2A−B, 2A−C, and 2B−A.
TP2 − Composite of subsamples TP2B−B and 2B−C.
WR1 − Composite of subsamples WR1A, 1B, 2A, and 2B.
BACKGROUND − From the Big Ox Mine (25−116−SS−1).

XRF ANALYSIS RESULTS

BALD MOUNTAIN
PA NO. 25-061

MDSL AMRB/PIONEER 4/9/93

Mine Name: Bald Mountain PA# 25-061
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-061-TP1-A		17707.2	26026.9	862.944		3185.94	15144.8		51.7009 *	364.37		474.176
25-061-TP1-B		16535.9	30940.1	910.079		2677.67	14987.5		46.6288 *	376.22		475.139
25-061-TP2A-A		18899.6	26915.3	1124.23		2279.64	18808.3			148.77		442.068
25-061-TP2A-B		18317.5	20302.1	858.951		1957.03	14315.2		45.0321 *	178.404		347.319
25-061-TP2A-C		17887.5	11972.1	2421.45		1386.27	21062.6			135.483 *	33.2867 *	427.466
25-061-TP2B-A		17752.7	23803.5	877.974		2045.44	14910.8			199.284	33.216 *	438.03
25-061-TP2B-B		8892.9	40349.1	740.539		1733.12	9802.61			140.235 *	32.5827 *	72.3999
25-061-TP2B-C		18097	13145.1	2384.38		566.92 *	21656.2			80.5506 *	41.1193 *	409.62
25-061-TP-1-COMP		18579.6	25874.9	789.715		2593.04	15843.9			215.179		427.982
25-061-TP-2-COMP		10954.7	36008	1157.64	130.116 *	2373.68	12091.3			166.839	30.7718 *	245.118
25-061-UNK-1		11534.7	24612	2115		1412.87	76130	512.266 *	342.172	1115.14		879.087
25-061-WR1-A		12085	96420	1036.73		2353.9	17496.1		78.831 *	166.016		82.3719
25-061-WR1-B		28374	29089.7	1426.63		602.284 *	18185.2			201.157	104.422 *	46.1865
25-061-WR2-A		19205.2	17197.3	1064.02		1514.46	19695.9			94.3755 *	25.9141 *	511.58
25-061-WR2-B		32568.2	7883.52	1255.17		2526.74	24170.9		52.383 *	165.655	116.05	169.457
25-061-WR-1-COMP		24512.2	21762	1476.88		1979.76	20694.5			133.962 *	67.3134 *	288.969

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-061-TP1-A	81.536	40.57 *		151.465	96.8229			634.87			9.7147 *
25-061-TP1-B	76.2344	37.9747 *		155.374	94.1661			644.188	64.1147 *		9.25552 *
25-061-TP2A-A	84.5497			56.1754 *	124.793			781.017			
25-061-TP2A-B	79.5063	29.6908 *		107.003	112.207			613.145	60.8223 *		
25-061-TP2A-C	173.301				106.65			1113.92			11.0205 *
25-061-TP2B-A	85.4552	31.8476 *		64.5788 *	109.767			831.8			9.4911 *
25-061-TP2B-B	71.5818	35.0177 *		51.5595 *	73.4178			262.061	63.6883 *		6.93965 *
25-061-TP2B-C	189.242	33.4774 *			100.771			1122.15	81.2511 *	13.8285 *	15.019 *
25-061-TP-1-COMP	98.8696			95.7969	116.576		39.1058 *	735.3			
25-061-TP-2-COMP	137.929			44.1701 *	89.2188			829.928	115.18 *		12.1307 *
25-061-UNK-1	175.004	54.6532 *		822.382	78.9815			1232.44			
25-061-WR1-A	116.93	46.0607 *		50.7479 *	118.642			448.636			10.2346 *
25-061-WR1-B	233.412	37.3116 *	51.1216	102.008	305.283			297.238			19.965 *
25-061-WR2-A	84.3818	31.6711 *			150.662			839.882			10.151 *
25-061-WR2-B	102.81	44.4794 *		22.8536 *	278.404			941.722	92.8208 *	17.4256 *	
25-061-WR-1-COMP	118.502		6.25797 *	33.7279 *	232.58			797.497	86.7833 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BALD MOUNTAIN
PA NO. 25-061

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: BALD MOUNTAIN
PA NUMBER: 25-061

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	4.597
6		WELLS - 1 MI. x 2.5		92.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		280
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	377.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	694147

SURFACE WATER PATHWAY

11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.054
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	20
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	4043

AIR PATHWAY

25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	150
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.135
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	911

DIRECT CONTACT PATHWAY

36		OBSERVED EXPOSURE		250
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	450
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.122
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	16
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	878

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**7.00**

SITE NAME: BALD MOUNTAIN
PA NUMBER: 25-061

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	400
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	400
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	16
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**128.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

ENERGY
LABORATORIES

ENERGY LABORATORIES, INC.
P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325

#8 T12N R6W 36 BBD

LABORATORY REPORT

Lab. No. 83-9677

To Hydrometrics

Date 12-20-83 CB

Address 2727 Airport Road Helena, MT 59601

SPECIAL WATER ANALYSIS

Goldsil Mining
O'Connel Residence
Sampled 12-13-83 @ 10:00
Samples Submitted 12-14-83

CONSTITUENT	mg/l	
Potassium	<1	
Sodium	3	
Calcium	39	
Magnesium	7	
Sulfate	24	
Chloride	1	
Carbonate	0	
Bicarbonate	133	
Hydroxide	0	
Total Dissolved Solids (calc.)	142	
Total Hardness as $CaCO_3$	128	
Total Alkalinity as $CaCO_3$	109	
Turbidity (lab)	0.44	N.T.U.
Specific Conductance @ 25°C	260	micromhos/cm
pH	6.7	
Nitrate + Nitrite as N	0.14	
Ortho-phosphate (PO_4-P)	<0.01	
Sodium Adsorption Ratio	0.10	
Fluoride	0.13	
Boron	<0.1	

METALS (Dissolved):

	mg/l		mg/l
Aluminum	<0.1	Mercury	<0.001
Cadmium	0.002	Nickel	<0.03
Copper	0.11	Selenium	<0.005
Iron	<0.03	Vanadium	<0.10
Lead	<0.01	Zinc	0.01
Manganese	<0.02		

ENERGY LABORATORIES

ENERGY LABORATORIES, INC.

P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325

T12N R6W 36BDC

#22

LABORATORY REPORT

Lab. No. 83-9678

To Hydrometrics

Date 12-20-83 CB

Address 2727 Airport Road Helena, MT 59601

SPECIAL WATER ANALYSIS

Goldsil Mining
Thomas Residence
Sampled 12-13-83 @ 10:30
Samples Submitted 12-14-83

CONSTITUENT	mg/l	
Potassium	<1	
Sodium	5	
Calcium	44	
Magnesium	6	
Sulfate	30	
Chloride	3	
Carbonate	0	
Bicarbonate	135	
Hydroxide	0	
Total Dissolved Solids (calc.)	156	
Total Hardness as $CaCO_3$	135	
Total Alkalinity as $CaCO_3$	110	
Turbidity (lab)	0.51	N.T.U.
Specific Conductance @ 25°C	297	micromhos/cm
pH	6.7	
Nitrate + Nitrite as N	1.22	
Ortho-phosphate (PO_4-P)	<0.01	
Sodium Adsorption Ratio	0.20	
Fluoride	0.13	
Boron	<0.1	

METALS (Dissolved):

	mg/l		mg/l
Aluminum	<0.1	Mercury	<0.001
Cadmium	<0.001	Nickel	<0.03
Copper	0.05	Selenium	<0.005
Iron	<0.03	Vanadium	<0.10
Lead	<0.01	Zinc	0.02
Manganese	<0.02		

ENERGY LABORATORIES

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#35

T12N R5W 34 CCA

LABORATORY REPORT

Lab. No. 83-9679

To Hydrometrics

Date 12-20-83 CB

Address 2727 Airport.Road Helena, MT 59601

SPECIAL WATER ANALYSIS

Goldsil Mining
Mine Office
Sampled 12-13-83 @ 13:50
Samples Submitted 12-14-83

CONSTITUENT	mg/l	
Potassium	1	
Sodium	5	
Calcium	60	
Magnesium	26	
Sulfate	25	
Chloride	3	
Carbonate	0	
Bicarbonate	284	
Hydroxide	0	
Total Dissolved Solids (calc.)	262	
Total Hardness as $CaCO_3$	257	
Total Alkalinity as $CaCO_3$	233	
Turbidity (lab)	43	N.T.U.
Specific Conductance @ 25°C	434	micromhos/cm
pH	7.3	
Nitrate + Nitrite as N	<0.05	
Ortho-phosphate (PO_4-P)	<0.01	
Sodium Adsorption Ratio	0.13	
Fluoride	0.16	
Boron	<0.1	

METALS (Dissolved):

	mg/l		mg/l
Aluminum	<0.1	Mercury	<0.001
Cadmium	0.003	Nickel	<0.03
Copper	<0.01	Selenium	<0.005
Iron	3.10	Vanadium	<0.10
Lead	<0.01	Zinc	<0.01
Manganese	0.06		

October 16, 1989
Marysville Water Sampling

Constituent	Limit*	Marysville House (1)	Ski Area (2)	Waite (3)	Prout (4)	Hoveland (5)
pH	-	7.1	7.5	7.6	7.2	7.4
Sp. Conductance	-	262	318	344	259	268
Sulfate	250	23	20	27	17	25
Total Cyanide	0.01	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate plus Nitrite as N	10	1.82	4.40	3.70	0.25	0.10
Aluminum	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	0.05	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	1.0	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	0.010	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	1.0	0.02	0.05	<0.01	<0.01	<0.01
Chromium	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
Iron	0.3	0.07	<0.03	<0.03	<0.03	<0.03
Lead	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
Mercury	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	-	<0.03	<0.03	<0.03	<0.03	<0.03
Selenium	0.01	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	0.05	<0.005	<0.005	<0.005	<0.005	<0.005
Vanadium	-	<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	5.0	<0.01	0.05	0.02	<0.01	<0.01

* Limit refers to either the maximum contaminant level or the recommended limit if one exists for the constituent with regards to drinking water standards for public drinking water systems.

Client Name: CHEN-NORTHERN, INC. HELENA, MT
Project No.: 87-911
Project Name: Soil Analysis AMR - Great Divide

October 22, 1991
Sheet 2 of 5

Laboratory No.: 120891
Sample Name: S-1 5.5'-6.0'
Sample Date: 10/10/91
Collected by: Mike Cormier
Time Sampled: None Given

PARAMETER	MEASURED VALUE		DATE ANALYZED
INORGANICS			
Cyanide as CN (Total, as received)	1.4	mg/kg	10/18/91
METALS			
Arsenic as As (Dissolved)	0.025	mg/l	10/15/91
Arsenic Dry Basis	12.9	mg/kg	10/15/91
Cadmium as Cd (Dissolved)	<0.005	mg/l	10/18/91
Cadmium Dry Basis	2.0	mg/kg	10/18/91
Chromium as Cr (Dissolved)	<0.02	mg/l	10/18/91
Chromium Dry Basis	7	mg/kg	10/18/91
Copper as Cu (Dissolved)	0.02	mg/l	10/18/91
Copper Dry Basis	93	mg/kg	10/18/91
Lead as Pb (Dissolved)	<0.02	mg/l	10/18/91
Lead Dry Basis	90	mg/kg	10/18/91
Mercury as Hg (Dissolved)	0.080	mg/l	10/17/91
Mercury Dry Basis	0.94	mg/kg	10/17/91
Zinc as Zn (Dissolved)	0.03	mg/l	10/18/91
Zinc Dry Basis	154	mg/kg	10/18/91
SOIL			
Electrical Conductivity, Saturated Paste	0.23	mmhos/cm	10/15/91
pH, Saturated Paste	7.6	S.U.	10/15/91

Client Name: CHEN-NORTHERN, INC. HELENA, MT
Project No.: 87-911
Project Name: Soil Analysis - AMR - Great Divide

October 22, 1991
Sheet 3 of 5

Laboratory No.: 120892
Sample Name: S-1 9.5'-10.0'
Sample Date: 10/10/91
Collected by: Mike Cormier
Time Sampled: None Given

PARAMETER	MEASURED VALUE		DATE ANALYZED
INORGANICS			
Cyanide as CN (Total, as received)	15	mg/kg	10/18/91
METALS			
Arsenic as As (Dissolved)	<0.00	mg/l	10/15/91
Arsenic Dry Basis	16.0	mg/kg	10/15/91
Cadmium as Cd (Dissolved)	<0.00	mg/l	10/18/91
Cadmium Dry Basis	2.3	mg/kg	10/18/91
Chromium as Cr (Dissolved)	<0.02	mg/l	10/18/91
Chromium Dry Basis	8	mg/kg	10/18/91
Copper as Cu (Dissolved)	<0.02	mg/l	10/18/91
Copper Dry Basis	60	mg/kg	10/18/91
Lead as Pb (Dissolved)	<0.02	mg/l	10/18/91
Lead Dry Basis	125	mg/kg	10/18/91
Mercury as Hg (Dissolved)	0.025	mg/l	10/17/91
Mercury Dry Basis	19.9	mg/kg	10/17/91
Zinc as Zn (Dissolved)	<0.02	mg/l	10/18/91
Zinc Dry Basis	168	mg/kg	10/18/91
SOIL			
Electrical Conductivity, Saturated Paste	0.25	mmhos/cm	10/15/91
pH, Saturated Paste	7.7	S.U.	10/15/91

Client Name: CHEN-NORTHERN, INC. HELENA, MT
Project No.: 87-911
Project Name: Soil Analysis - AMR - Great Divide

October 22, 1991
Sheet 4 of 5

Laboratory No.: 120893
Sample Name: S-2 5.5'-6.0'
Sample Date: 10/10/91
Collected by: Mike Cormier
Time Sampled: None Given

PARAMETER	MEASURED VALUE		DATE ANALYZED
INORGANICS			
Cyanide as CN (Total, as received)	2.6	mg/kg	10/18/91
METALS			
Arsenic as As (Dissolved)	0.014	mg/l	10/15/91
Arsenic Dry Basis	28.7	mg/kg	10/15/91
Cadmium as Cd (Dissolved)	<0.005	mg/l	10/18/91
Cadmium Dry Basis	2	mg/kg	10/18/91
Chromium as Cr (Dissolved)	<0.02	mg/l	10/18/91
Chromium Dry Basis	3	mg/kg	10/18/91
Copper as Cu (Dissolved)	<0.02	mg/l	10/18/91
Copper Dry Basis	304	mg/kg	10/18/91
Lead as Pb (Dissolved)	<0.02	mg/l	10/18/91
Lead Dry Basis	279	mg/kg	10/18/91
Mercury as Hg (Dissolved)	0.036	mg/l	10/17/91
Mercury Dry Basis	0.57	mg/kg	10/17/91
Zinc as Zn (Dissolved)	0.03	mg/l	10/18/91
Zinc Dry Basis	446	mg/kg	10/18/91
SOIL			
Electrical Conductivity, Saturated Paste	0.25	mmhos/cm	10/15/91
pH, Saturated Paste	7.9	S.U.	10/15/91

Client Name: CHEN-NORTHERN, INC. HELENA, MT
Project No.: 87-911
Project Name: Soil Analysis - AMR - Great Divide

October 22, 1991
Sheet 5 of 5

Laboratory No.: 120894
Sample Name: S-2 9.0'-9.5'
Sample Date: 10/10/91
Collected by: Mike Cormier
Time Sampled: None Given

PARAMETER	MEASURED VALUE		DATE ANALYZED
INORGANICS			
Cyanide as CN (Total, as received)	<0.06	mg/kg	10/18/91
METALS			
Arsenic as As (Dissolved)	<0.005	mg/l	10/15/91
Arsenic Dry Basis	13.5	mg/kg	10/15/91
Cadmium as Cd (Dissolved)	<0.005	mg/l	10/18/91
Cadmium Dry Basis	1.5	mg/kg	10/18/91
Chromium as Cr (Dissolved)	<0.02	mg/l	10/18/91
Chromium Dry Basis	8	mg/kg	10/18/91
Copper as Cu (Dissolved)	<0.02	mg/l	10/18/91
Copper Dry Basis	51	mg/kg	10/18/91
Lead as Pb (Dissolved)	<0.02	mg/l	10/18/91
Lead Dry Basis	69	mg/kg	10/18/91
Mercury as Hg (Dissolved)	0.066	mg/l	10/17/91
Mercury Dry Basis	0.50	mg/kg	10/17/91
Zinc as Zn (Dissolved)	<0.02	mg/l	10/18/91
Zinc Dry Basis	120	mg/kg	10/18/91
SOIL			
Electrical Conductivity, Saturated Paste	0.32	mmhos/cm	10/15/91
pH, Saturated Paste	7.7	S.U.	10/15/91

25-061, #5: Mill foundation

25-061, #6: WR-2

25-061, #7: TP-2A and TP-2B

25-061, #8: TP-2A and TP-2B

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BIG OX MILLSITE PA#: 25-115

Date: June 9, 1993 Time: 0800

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Approx. 60°F; clear; slight breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #2: SW-1; #3: SW-2, upgradient in Deer Creek; #4: Cabin with furnace; #5: Mill building; #6: Tailings pond. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate stream from the tailings; grade, amend and revegetate. Repository may be feasible due to small volume.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BIG OX MILLSITE PA#: 25-115

Legal Description: T 12N ;R 6W ;Sec. 24 , NW1/4SW 1/4 1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 47' 33" Longitude: W 112° 18' 12"

Primary Drainage Basin and Code: Little Prickly Pear/10030101
Secondary Drainage Basin: Deer Creek

USGS Quadrangle map name(s): Canyon Creek

Mine Type/Commodities: Millsite/Gold, Silver, Copper, Lead

Activity Status: Active ___,Inactive/Exploration ___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): J.F. Fulton, address not available.

Relationship to other mines/sites in the area/district: Big Ox Mine is adjacent to this millsite.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4698', Slope 1°, Aspect Northern

Land use: Mining ___, Recreational X , Residential ___, Urban ___, Agricultural X , Other(Specify) ___

Area of disturbed/unvegetated lands? 1.25 acres.
Dimensions: ___

Predominant vegetation types: Lodgepole and Ponderosa pines, aspen, Douglas fir, roses, lilacs

Access: roads - good X ,poor ___,4wd ___,trail ___.
Other logistical considerations (proximity to other sites). Access Big Ox Mine through the millsite

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in drainage of Deer Creek, which flows north through the site. Deer Creek joins Little Prickly Pear Creek approx. 1 mile north of the site. The site is underlain by highly metamorphosed limestones and slates which may overlie outlier of the Boulder Batholith.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

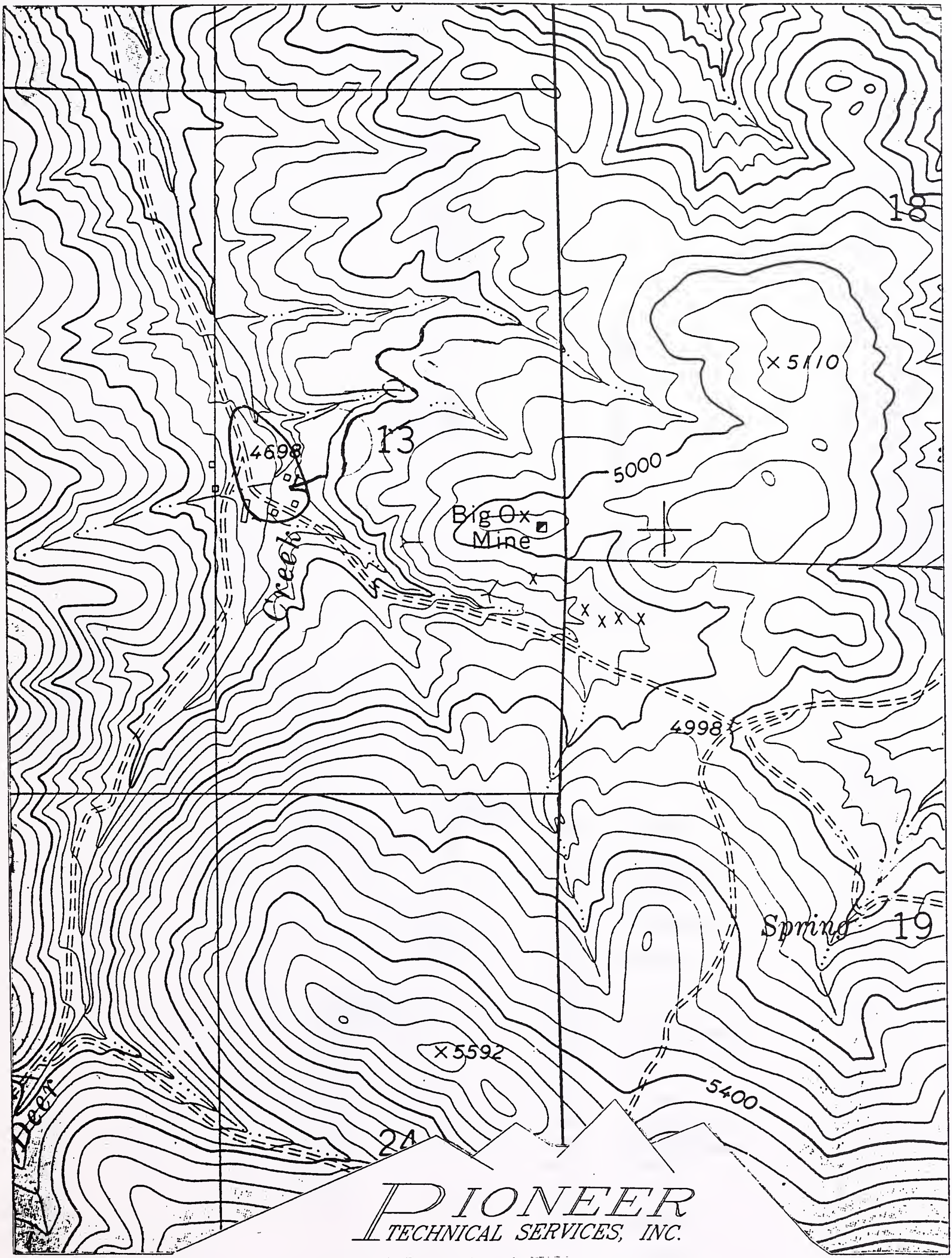
Shafts - Yes ___, No X, # ___, Comment ___
Adits - Yes ___, No X, # ___, Comment ___
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: Judging by structures and equipment remaining on the site, operation was approx. from the 1890's to the 1940's.

Origin of Ore Milled - Custom Mill ___ Dedicated Mill X; Number and names of mines that supplied mill feed: Big Ox Mine

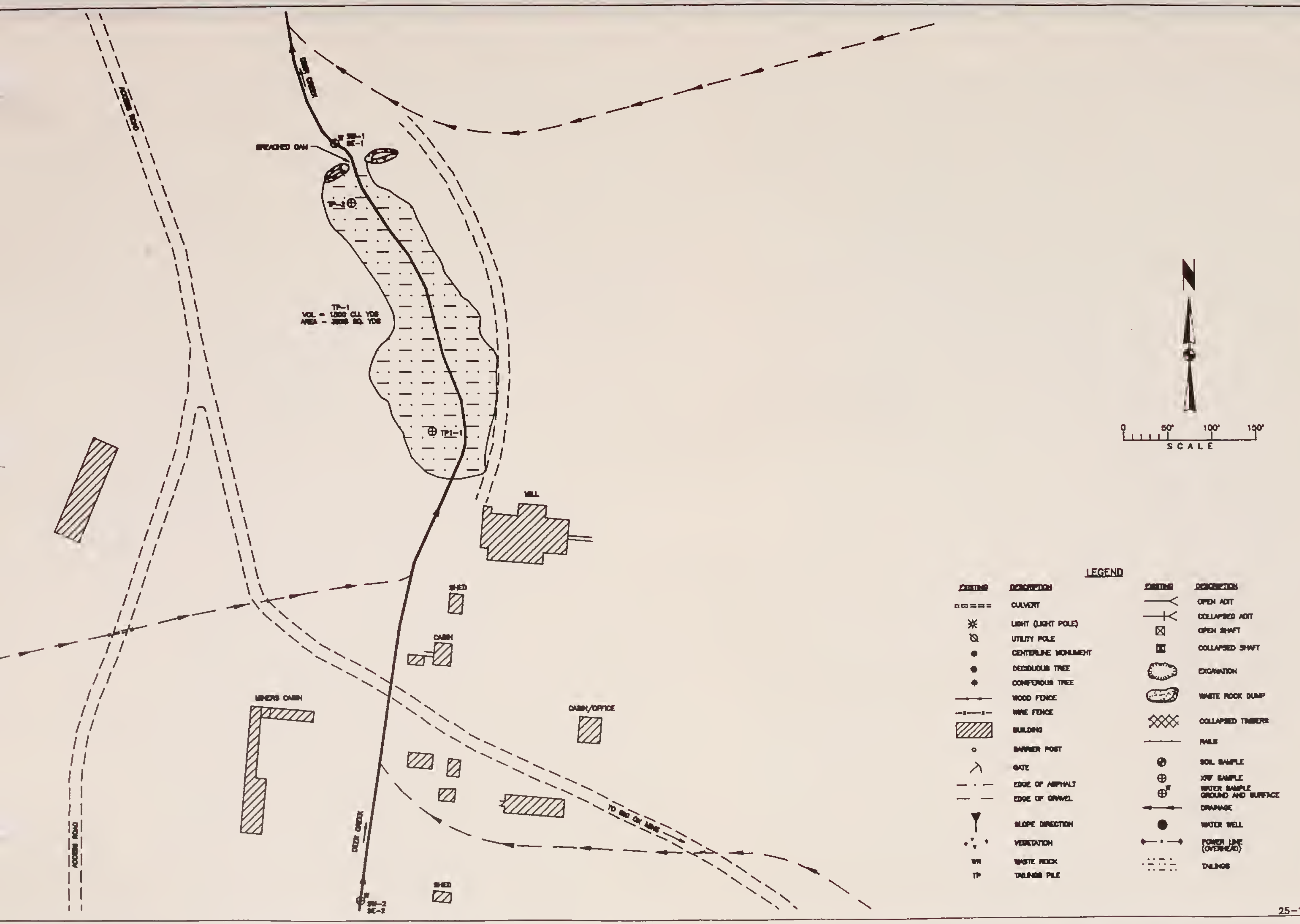
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Floatation



PIONEER
TECHNICAL SERVICES, INC.

BIG OX MILLSITE, P.A. NO. 25-115

T12N, R06W, SECTION 24
SCALE: 1" = 1000'



25-115.DWG

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BIG OX MILLSITE PA# 25-115
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

PIONEER

TD&H

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Coarse sand to clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Upper layer near mill is fine brown/gray clay; lower layer is sand. No significant color change was observed.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Mostly dry except for Deer Creek sediments.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Breached at north end; minor release verified.

Comments on potential for mitigation: Excavation and consolidation; cap in repository; revegetation very probable due to high pH in tailings and lack of sulfides.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1-1A	TAIL	1,500	South end near mill building; 6"-1', fine gray clay	Poor	3.9 (D)	0.04	25-115-TP-1	06/09/93 1400	T-Metals, ABA
TP-1-1B	TAIL		South end near mill building; 1-3', coarse gray sand	Poor	5.4 (D)	0.05			
TP-1-1C	TAIL		South end near mill building; 3', topsoil	Poor	5.2 (D)	0.04	N/A	N/A	XRF Analysis
TP-1-2A	TAIL		Northwest corner by breach; 0-6", topsoil with tailings	Poor	5.4 (D)	0.04			
TP-1-2B	TAIL		Northwest corner by breach; 6-12", tan/orange coarse sand	Poor	NM	NM	N/A	N/A	XRF Analysis
CABFLR	OTH	ND	Floor of cabin with furnace	Cabin	NM	NM	N/A	N/A	XRF Analysis
FURN	OTH	Approx. 1	Contents of brick furnace inside cabin	N/A	4.1 (D)	0.04	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-115-TP-1 is composite of TP-1-1A and -1-1B, and TP-1-2A.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 317

Distance to nearest well used for drinking? Approx. 1 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Tailings containing elevated metals levels were deposited in broad flat floodplain with the possibility of contact with the shallow alluvial aquifer.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS:

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___ , Name(s): Deer Creek

Dry streambeds: Yes X , No ___ , Name(s): Drainage associated with the Big Ox Mine to the east of the town site.

Other surface water: Yes X , No ___ , Name(s)/Description: Wetlands are present approx. 300 feet downgradient of the tailings pond.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 0.5 cfs , Average Flow: 0.05 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ___ ,
Describe: Deer Creek runs through TP-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, stock watering, fishery

Observed erosional/sedimentation/stream turbidity problems? Yes X , No ___ , Distance downstream (ft)? 360' Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Tailings in sediments; tailings dam is breached and elevated lead levels observed 360 feet below the dam.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Deer Creek below tailings at the tailings dam breach	8.74	376	189	20.3	205	20 gpm (E)	25-115-SW-1	06/09/93 1150	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Deer Creek below tailings at the tailings dam breach	N/A	N/A	N/A	N/A	N/A	N/A	25-115-SE-1	06/09/93 1150	T-Metals
SW-2	SW	Upgradient sample at the old well casing	8.79	376	189	15.8	240	50 gpm (E)	25-115-SW-2	06/09/93 1210	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upgradient sample at the old well casing	N/A	N/A	N/A	N/A	N/A	N/A	25-115-SE-2	06/09/93 1210	T-Metals
SE-3	SE	Wetlands area below dam breach	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-4	SE	360 feet downstream of dam	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X , No ___, Describe: Approx. 1 acre below dam breach

Carbonate rocks/soils: Yes X , No ___, Describe: Limestone is reported as host rock in the area.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	pH	Partial	34,425	17,200	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_,
Describe:__________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments__________

Evidence of recreational use on site: Yes_X_, No_____, Describe:
Campfire rings, garbage

Accessibility - Fences, warning signs, closed roads? One closed fence with no lock on the gate.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes_X_, No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:__________

Hazardous structures: Yes_X_, No___, Number_11_, types and locations:
Mill, cabins and old house

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:__________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations: Tailings impoundment has been breached; minimal erosion is still occurring.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:__________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Big Ox Mine, Prepared by Northern Engineering and Testing, May 25, 1988.

MDSL/AMRB Files, Report on the Big Ox and Little Ox Mining Property, Helena, Montana, Written by Charles E. Meyers, September 1, 1939.

USGS, Topographic Map, Canyon Creek, Montana, 7 1/2 minute Quadrangle, 1968.

LABORATORY ANALYTICAL DATA

BIG OX MILLSITE
PA NO. 25-115

Big Ox Millsite PA# 25-115
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/09/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-115-SE-1	138 J	42.1	84	4.8	4.8	426	21400	8.84	3280	20 J	6790	54 J	8810	NR
25-115-SE-2	22 J	86.7	0.5 UJ	3.2	10.1	10.8	10300	0.095	209	9 J	18	4 UJ	62	NR
25-115-TP-1	285 J	25.8	221	5.6	3.3	1130	27500	6.07	2500	19 J	10900	107 J	24000	NR
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-115-TP-1	4.26	133	146	13.9	0.29	1.62	2.35	50.6	95.5

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-115-SW-1	10.5	52.7	2.55 U	5.99 U	7.7	4.27	22.8	0.19	3.6	12.1	28.9	18.3 U	32.1	212
25-115-SW-2	10.1	73.1	2.87	5.99 U	5 U	2.43	986	0.18	21.8	8.78 U	3.82	18.3 U	18.8	242

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-115-SW-1	223	< 5.0	25	< 0.05	NR
25-115-SW-2	283	< 5.0	24	0.19	NR

LEGEND

SE1 - Deer Creek below tailings @ the dam breach.
SE2 - Upgradient sample @ the old well casing.
TP1 - Composite of subsamples TP1-1A, 1-1B, and 1-2A.
BACKGROUND - From the Big Ox Mine (25-116-SS-1).
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

BIG OX MILLSITE
PA NO. 25-115

MDSL AMRB/PIONEER 4/9/93

Mine Name: Big Ox Millsite PA# 25-115
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-115-CABFLR		10971.7	26137.5	1142.84	127.254 *	1729.52	27655.7		3071.39	12700.1	3888.16	110.576
25-115-CABFLR-2		33451.2	10125.4	1616.03		3289.89	49623.1		488.724	815.165		69.5228
25-115-FURN		9997.48	68104.5	990.726		1375.19 *	54268.2		571.217	7559.85		182.185
25-115-SE-1		15755.7	28666.1	1147.48		1541.78	19564.3		394.134	8009.43		86.5011
25-115-SE-2		12056.2	9575.61	1464.48			11819.6			255.796	44.1115 *	73.5975
25-115-TP1-1A		29392.1	62780.3	2472.93		3448.57	31853.9		1570.61	22253.3		132.893
25-115-TP1-1B		30785.4	62149	2433.4		3337.94	30623.3		1682.5	21968.5		128.798
25-115-TP1-1C		16245.5	19228.2	1650.14		1289.8 *	20700.7		335.864	12109.8		108.151
25-115-TP1-2A		15589.3	11127.5	571.258			15885.9		448.746	2908.36		67.8863

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-115-CABFLR	120.76	81.3979 *		2569.57	69.7537		57.2972 *	371.881	98.5202 *		
25-115-CABFLR-2	137.518		68.0174	4655.32	124.925	111.128 *	214.728	545.152	103.514 *		
25-115-FURN	92.4348	538.515		3995.46	54.1294 *		163.612	320.203	135.477 *		
25-115-SE-1	110.899			2304.21	90.2242	142.66 *	126.631 *	386.875	118.044 *		
25-115-SE-2	213.619			41.6239 *	103.118			444.878	92.7476 *		11.3496 *
25-115-TP1-1A	80.6248			15305.3	143.292	522.556	523.469	333.641	231.806 *		54.0812 *
25-115-TP1-1B	87.8372			14740.7	133.045	463.585 *	533.033	346.924	198.388 *		53.2248 *
25-115-TP1-1C	191.526			1725.68	104.397		61.3757 *	462.693	63.0049 *		
25-115-TP1-2A	45.4373		11.8306 *	953.17	107.836	124.35 *	70.7731 *	294.934	104.551 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BIG OX MILLSITE
PA NO. 25-115

AIMSS SCORESHEET

SITE NAME: BIG OX MILLSITE
PA NUMBER: 25-115

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	11.491
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		315
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	320.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1470848
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	12.655
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	13
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	131612
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.266
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	15
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	950
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.149
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	689
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**16.04**

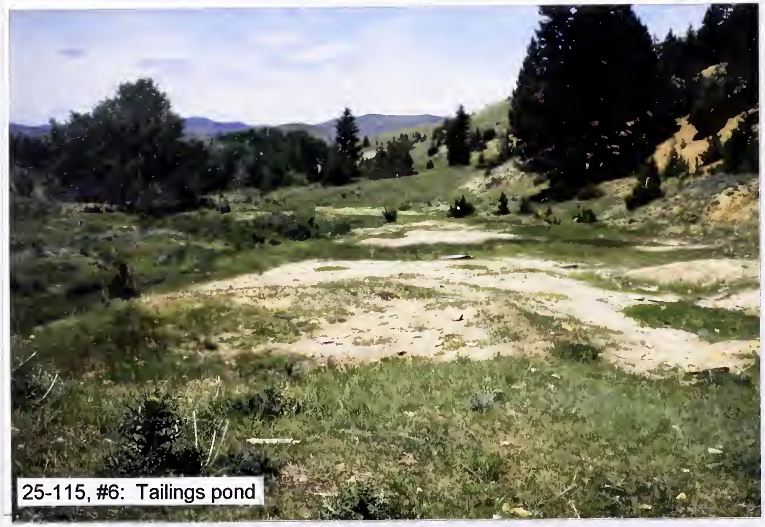
			SITE NAME:	BIG OX MILLSITE
			PA NUMBER:	25-115
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	440
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	440
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**26.40**

25-115, #2: SW-1 sample location

25-115, #3: SW-2 sample location

25-115, #4: Cabin with furnace

25-115, #5: Mill building



25-115, #6: Tailings pond

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BIG OX MINE PA#: 25-116

Date: June 9, 1993 Time: 0800

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear; slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #18: Excavation trench #1 (furthest east) and WR-1; #19: WR-2 associated with exploration trench #2; #20: Adit #3; #21: WR-3; #22: Adit #4A (caved); #23: Adit #4B (culvert); #24: Shaft #1. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: No remediation is required; waste rock is far from surface water. Waste rock will probably revegetate on its own, otherwise, it would be easy to recontour and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BIG OX MINE PA#: 25-116

Legal Description: T 12N ;R 6W ;Sec. 13 , NE1/4 SE1/4 ___1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 47' 28" Longitude: W 112° 17' 45"

Primary Drainage Basin and Code: Little Prickly Pear/10030101
Secondary Drainage Basin: Deer Creek

USGS Quadrangle map name(s): Canyon Creek

Mine Type/Commodities: Hardrock/Gold, Silver, Lead, Copper

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): J.F. Fulton, address not available.

Relationship to other mines/sites in the area/district: Big Ox Millsite is located to the west.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Four HMO's have been closed by MDSL.

General site features: Elevation 4850' , Slope 12°-25° ,
Aspect South

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 0.7 acres.
Dimensions: Site is spread over 1/3 mile on the side of a hill; unvegetated area is approximately 0.7 acre.

Predominant vegetation types: Grasses, forbs, pine

Access: roads - good X ,poor___,4wd___,trail X .
Other logistical considerations (proximity to other sites). Need to walk from Big Ox Millsite

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 17 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Adits and shafts lay on the north side of a dry drainage to Deer Creek. Water from the site would flow south into dry drainage, then northwest to Deer Creek. Deer Creek has a confluence with Little Prickly Pear Creek 1.5 miles north of the site.

Mining/milling history, ore type/tenor, host rock, gangue: Site operated from 1890's to 1940's. Host rock is highly metamorphosed limestone and slates which overlie a possible extension of the Boulder Batholith. Vein deposits are quartz and calcite holding a little galena, chalcopyrite, and light colored sphalerite.

Mine Operation?

Shafts -	Yes X	No ___	# 1	Comment Grate closure
Adits -	Yes X	No ___	# 5	Comment 1 partially open; 3 closed by DSL; 1 collapsed
Pits -	Yes ___	No X	# ___	Comment
Placers -	Yes ___	No X	# ___	Comment
Other -	Yes X	No ___	# 2	Comment Trenches

Mill Operation? Yes ___, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

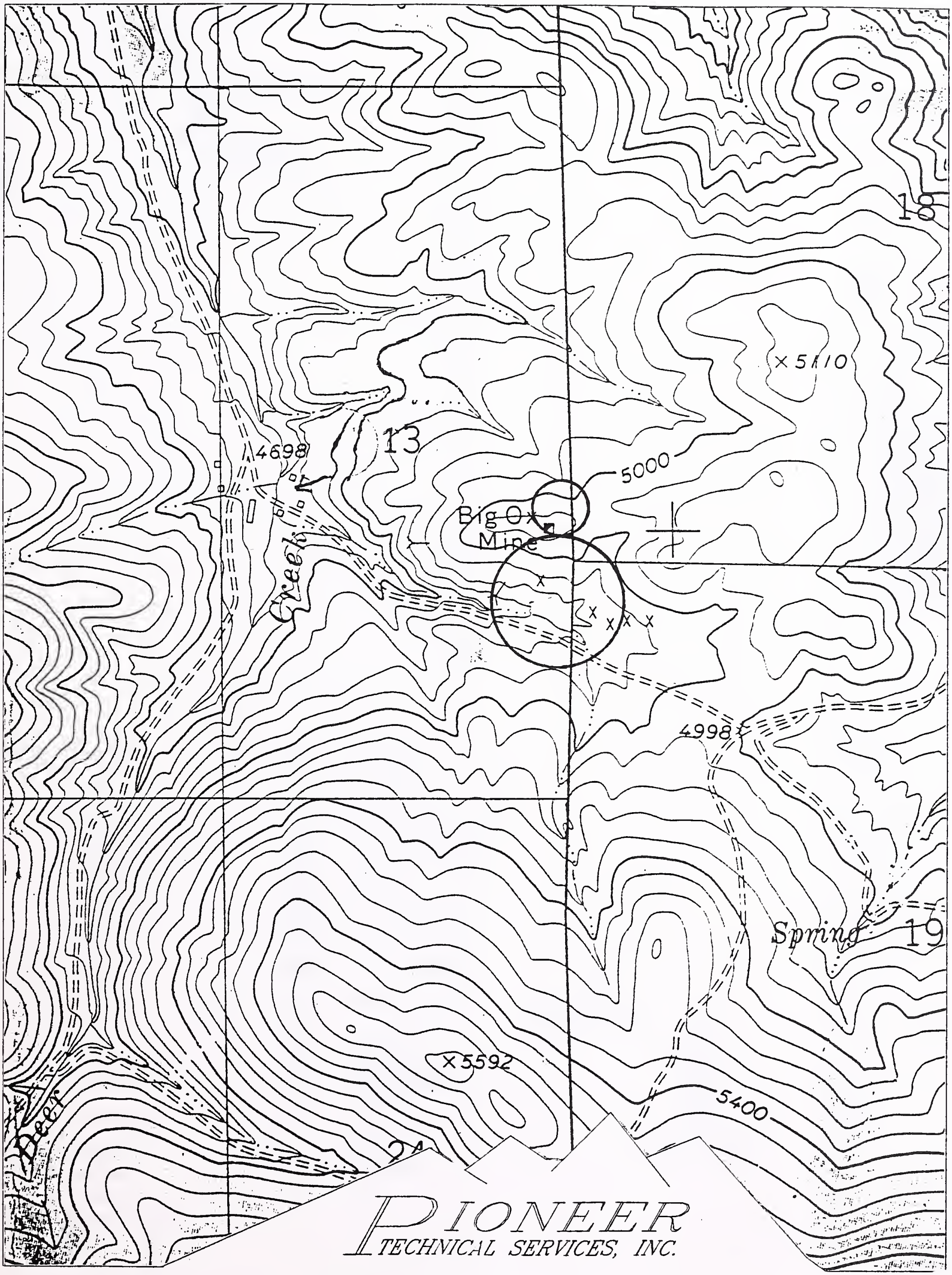
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/05/1993

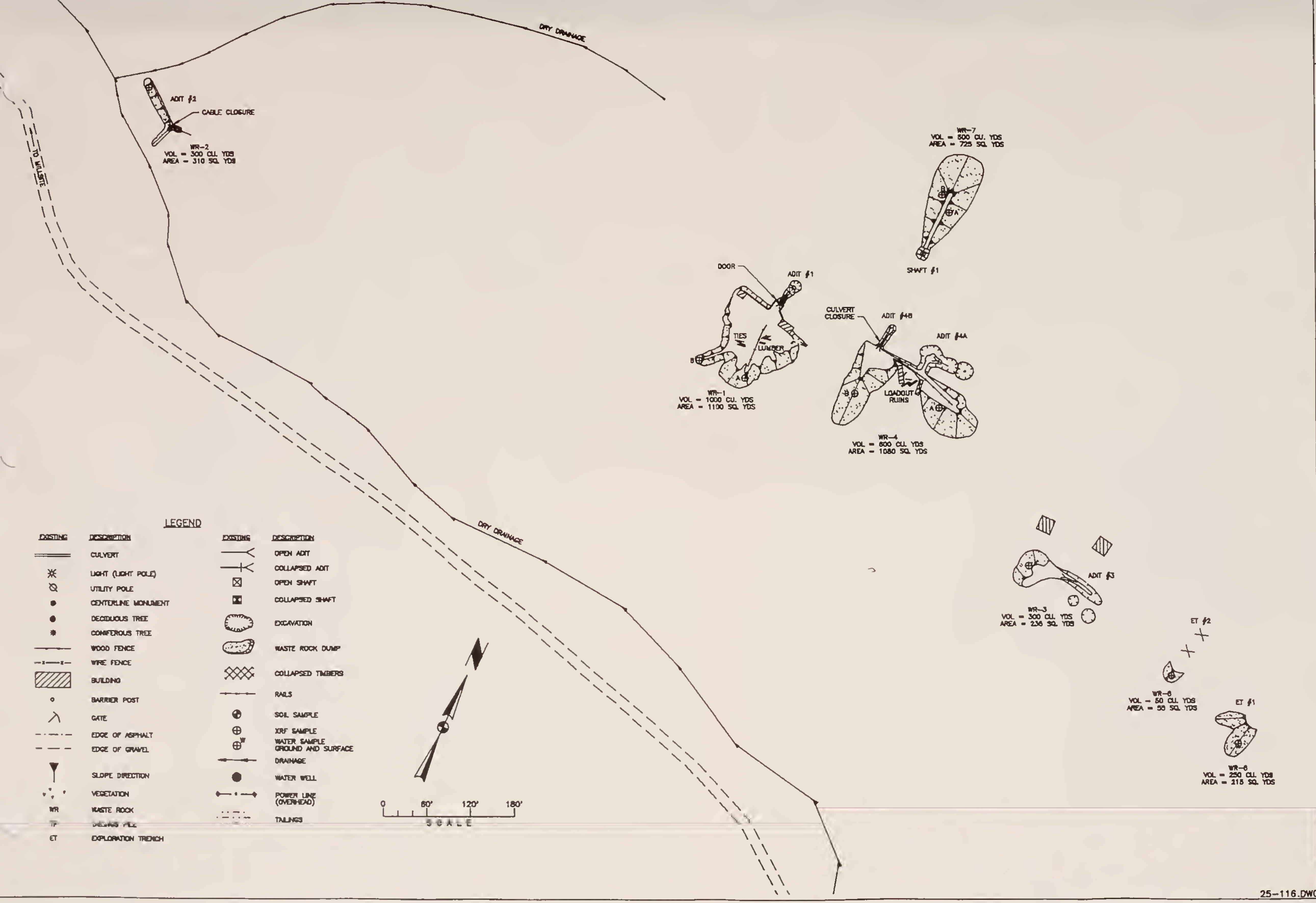
Well No.	Location	Depth	Yield	Static Water Level
M:66416	12N 06W 11	85.0	30.0	8.00
M:66417	12N 06W 11 CC	48.0	24.0	25.00
M:66418	12N 06W 11 CDA	8.0	60.0	0.00
M:66419	12N 06W 11 DCB	140.0	20.0	20.00
M:66421	12N 06W 12	24.0	20.0	10.00
M:66420	12N 06W 12	16.0	15.0	10.00
M:66422	12N 06W 12 ACC	26.0	15.0	10.00
M:66430	12N 06W 23 DBB	40.0	8.0	19.00
M:66355	12N 05W 07	25.0	20.0	3.00
M:66356	12N 05W 07 AA	15.0	0.0	0.00
M:66357	12N 05W 07 ACC	30.0	18.0	8.00
M:66358	12N 05W 07 AD	25.0	15.0	0.00
M:66359	12N 05W 07 ADC	20.0	15.0	0.00
M:66360	12N 05W 07 CA	0.0	15.0	48.00
M:66361	12N 05W 07 DBD	20.0	15.0	0.00
M:66362	12N 05W 07 DBD	35.0	15.0	0.00
M:66388	12N 05W 18	320.0	3.0	60.00



PIONEER
TECHNICAL SERVICES, INC.

BIG OX MINE, P.A. NO. 25-116

T12N, R06W, SECTION 13
SCALE: 1" = 1000'



DRAWN MWC	DATE 11/93
DESIGNED TPR	JOB NO. 93-17
APPROVED	F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
BIG OX PA# 25-116
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-116.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	1,000	Southeast knob of WR-1, larger lobe below knob	None	6.25 (D)	0.04	25-116-WR-4	06/09/93 1540	T-Metals, ABA
WR-1B	WR		Southwest knob of WR-1, smaller knob just below knob	None	6.8 (D)	0.02			
WR-2	WR	300	On west knob of east side of dump	None	6.8 (D)	0.03	25-116-WR-2	06/09/93 1520	T-Metals, ABA
WR-3	WR	300	Off of knob on dump associated with Adit #3	None	7.0 (D)	0.04	N/A	N/A	XRF Analysis
WR-4A	WR	500	East lobe on south side of dump associated with Adit #4A	None	7.0 (D)	0.04	25-116-WR-4	06/09/93 1530	T-Metals, ABA
WR-4B	WR		West lobe off knob on dump associated with Adit #4B	None	6.8 (D)	0.04			
WR-5	WR	250	Off knob of dump associated with ET #1	None	6.6 (D)	0.05	N/A	N/A	XRF Analysis
WR-6	WR	50	Off knob of dump associated with ET #2	None	6.8 (D)	0.03	N/A	N/A	XRF Analysis
WR-7A	WR	500	Southwest side of dump	None	6.4 (D)	0.03			
WR-7B	WR		Northwest side of knob on dump	None	7.0 (D)	0.02			
SS-1	BKGRND	N/A	Background soil southeast of mill building, on top of hill before mines	None	6.75 (D)	0.03	25-116-SS-1	06/09/93 1420	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-116-WR-1 is composite of WR-1A and -1B. 25-116-WR-2 is grab of WR-2. 25-116-WR-4 is composite of WR-4A and -4B, and WR-7A and -7B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 112

Distance to nearest well used for drinking? Approx. 1 mile according to topographic map

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
High metal values in dumps, but very little water present on-site.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):

Dry streambeds: Yes_X__, No____, Name(s): Unnamed tributary to Deer Creek

Other surface water: Yes_X__, No___, Name(s)/Description: Deer Creek is approximately 1,500 feet below the site.

Waste materials within any floodplain: Yes_____, No_X_ Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:____________, Average Flow:______________

Distance between waste source(s) and nearest surface water body (ft)?
Approx. 40 feet between dumps and unnamed tributary.

Surface water draining onto or through waste sources: Yes____, No_X__,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes__X__, No_____, Distance downstream (ft)? 100 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Erosion evidenced by waste rock in dry drainage.

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 1 acre

Wetlands present: Yes___, No X, Describe:

Carbonate rocks/soils: Yes X, No___, Describe: Limestone is reported in literature to be in the area.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Moist	9,900	9,900	Yes	Low
WR-2	None	Moist	2,790	2,790	Yes	Low
WR-3	None	Moist	2,115	2,115	Yes	Low
WR-4	SO3 (little)	Moist	9,720	9,720	Yes	Low
WR-5	SO3	Moist	1,935	967	Yes	Low
WR-6	None	Moist	495	123	Yes	Low
WR-7	SO3 (some)	Moist	6,525	6,525	Yes	Low

Notes and Clarifications: Waste rock piles wet at the time of this investigation due to recent rain.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X__,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None______________________________________

Evidence of recreational use on site: Yes___, No_X_, Describe:_______
____

Accessibility - Fences, warning signs, closed roads?_One closed fence
with no lock_____________________________________

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment_______________
Wilderness Area - Yes___, No_X_, Comment_______________
T&E Species Habitat - Yes_X_, No___, Comment_Peregrine Falcon___
Bat Habitat - Yes_X_, No___, Comment_Adits_______________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1__, types and locations:___
Adit #3 is partially open.______________________________
____

Hazardous structures: Yes_X_, No___, Number_2__, types and locations:_
Buildings_____________________________________
____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:_______________________________
____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_7__, types and locations:_All dumps are sloughing.________
____
____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________
____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Big Ox Mine, Prepared by Northern Engineering and Testing, May 25, 1988.

MDSL/AMRB Files, Report on the Big Ox and Little Ox Mining Property, Helena, Montana, Written by Charles E. Meyers, September 1, 1939.

USGS, Title Unknown, Professional Paper 57, Author Unknown, Date Unknown, p. 111.

USGS, Topographic Map, Canyon Creek, Montana, 7 1/2 minute Quadrangle, 1968.

LABORATORY ANALYTICAL DATA

BIG OX MINE
PA NO. 25-116

Big Ox Mine PA# 25−116
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 06/09/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−116−WR−1	53 J	167	9.6	16.6	11	260	25200	0.247	700	10 J	596	16 J	1200	NR
25−116−WR−2	25 J	232	0.4 UJ	6.8	12.3	19.7	14400	0.147	591	13 J	24	3 UJ	49	NR
25−116−WR−4	77 J	138	11.3	5.4	11.9	111	18400	1.08	827	12 J	1680	9 J	1550	NR
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25−116−WR−1	0.89	27.8	203	175	<0.01	0.96	0.03	30	173

LEGEND

WR1 − Composite of subsamples WR1A and 1B.
WR2 − Sample of the WR2 subsample.
WR4 − Composite of subsamples WR4A, 4B, 7A, and 7B.
BACKGROUND − SE of mill building on top of hill before mines. From the Big Ox Mine (25−116−SS−1).

XRF ANALYSIS RESULTS

BIG OX MINE
PA NO. 25-116

Mine Name: Big Ox Mine PA# 25-116
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-116-SS-1		22233.2	12293.8	2424.98		1071.3 *	24321.4			166.821 *	46.0272 *	96.1912
25-116-SS-1A		22211.9	12259.7	2308.47		794.374 *	24216.8			125.54 *		96.9525
25-116-TP-1-COMP		17066.6	59315.9	1174.07		2615.76	21807.6		1103.49	17415.1		111.446
25-116-WR1-A		9024.83	49924.1	919.033		462.972 *	27079.2		82.7315 *	1688.39	61.7486 *	95.0748
25-116-WR1-B		6298.23	38859.8	1323.94		1049.43 *	36175.3		85.2104 *	2454.66	83.1989 *	213.059
25-116-WR2-A		6898.05	46584.7	922.82	149.593 *	401.469 *	16690.6			222.133	37.4346 *	63.3324
25-116-WR3-A			11213	1732.08		3656.01	51011.8		491.67	709.762		98.2049
25-116-WR4-A		12687.9	38815.1	863.646		2378.07	29849.8		308.009	4927.51		36.7219
25-116-WR4-B		9472.02	38195.9	1259.09	104.232 *	1198.55 *	33192.6		346.425	5486.2		63.7107
25-116-WR5-A		8360.74	54103.5	1011.05		2607.94	30855.8			421.704		142.309
25-116-WR6-A		10271.5	24226.2	1527.94		480.028 *	22520.4			99.3245 *		256.806
25-116-WR6-A2		33451.2	10125.4	1616.03		3289.89	49623.1		488.724	815.165		69.5228
25-116-WR7-A		9954.3	56987.1	1366.56			19738.3			122.566 *		79.3651
25-116-WR7-B		8223.64	50849.2	994.182		1513.78 *	33442		202.618 *	4201.42		69.2289

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-116-SS-1	252.254				100.773			1137.91			11.4178 *
25-116-SS-1A	244.691				106.686			1139.58			11.7423 *
25-116-TP-1-COMP	75.4714			7102.47	88.803	348.883 *	277.599	206.74	161.487 *		25.2088 *
25-116-WR1-A	104.875			177.562	72.7653			483.168			8.58593 *
25-116-WR1-B	79.2292			359.276	43.4277 *			348.497	75.3873 *		
25-116-WR2-A	125.371		28.0153	38.4535 *	63.5494			674.127			
25-116-WR3-A	142.289		65.1481	5390.13	128.663		257.127	537.045	79.9013		18.6502
25-116-WR4-A	119.715		74.3145	2787.23	110.313	113.254 *	99.6499 *	434.607			
25-116-WR4-B	87.5567		13.1601 *	1842.49	59.8342		112.074 *	209.963	72.1216 *		
25-116-WR5-A	127.129		91.6689	728.29	42.8022 *			525.579	97.0003 *		
25-116-WR6-A	121.228		16.631 *	27.2402 *	42.9346 *			733.062	67.7247 *		
25-116-WR6-A2	137.518		68.0174	4655.32	124.925	111.128 *	214.728	545.152	103.514 *		
25-116-WR7-A	139.297			26.1707 *	69.9671	107.059 *		909.169	65.4167 *	13.7867 *	9.20605 *
25-116-WR7-B	99.4874			1638.75	50.3063 *		48.1281 *	316.009			

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BIG OX MINE
PA NO. 25-116

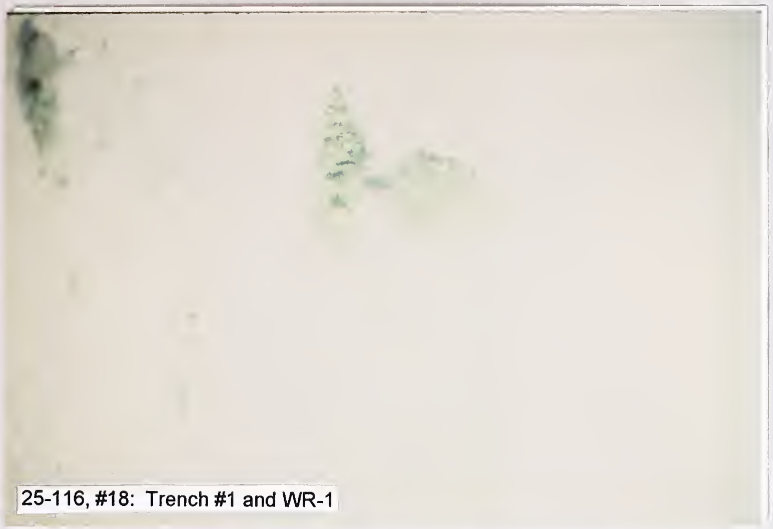
AIMSS SCORESHEET

SITE NAME: BIG OX MINE
PA NUMBER: 25-116

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.345
6	GW - TARGETS	WELLS - 1 MI. x 2.5		42.5
7		WELLS - 1 TO 4 MI		95
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	137.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	12898
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.590
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	8
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	829
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.197
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	34
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.14**

			SITE NAME:	BIG OX MINE
			PA NUMBER:	25-116

LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	130
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**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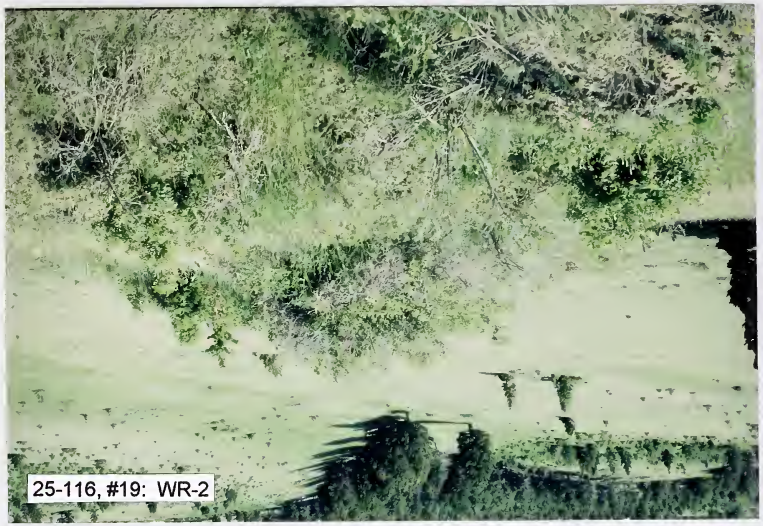
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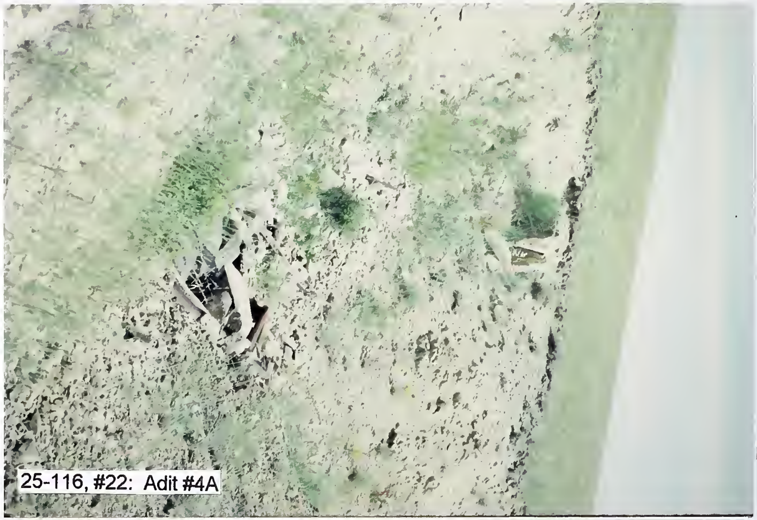
25-116, #20: Adit #3

25-116, #21: WR-3



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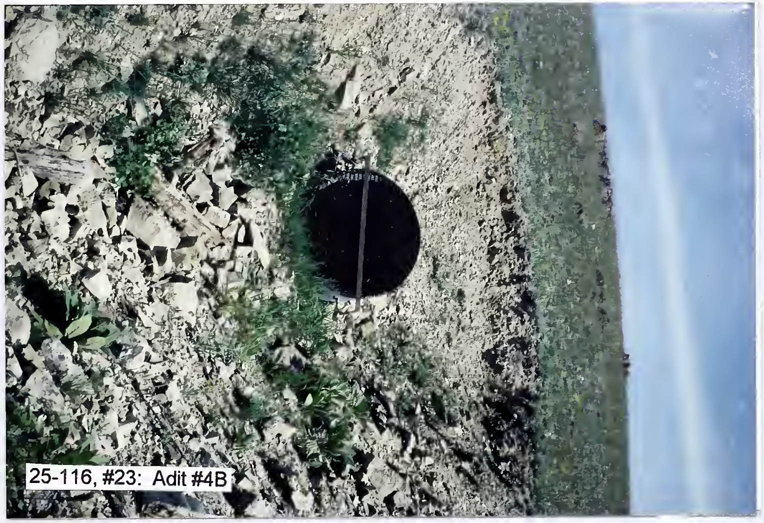
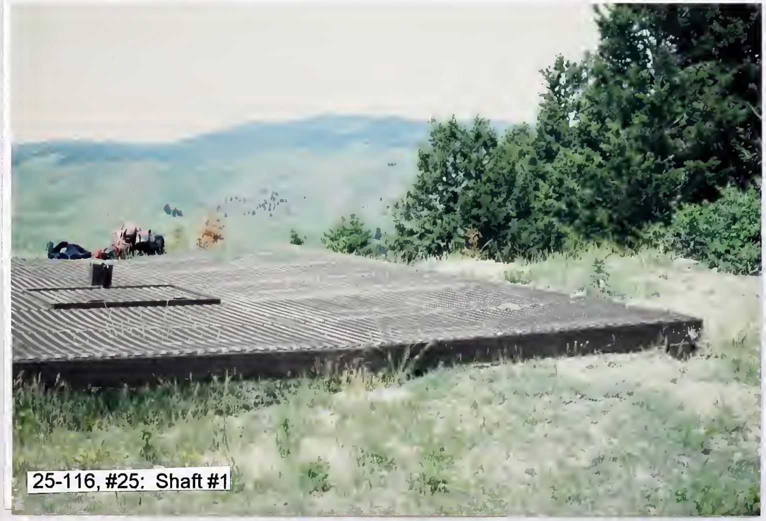


25-116, #23: Adit #4B



25-116, #25: Shaft #1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BELMONT PA#: 25-167

Date: August 19, 1993 Time: 0900

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: Lasher, Pioneer
Flammang, Pioneer

Visitors: Kevin Taylor, Owner of the Great Divide Ski Area

Weather/Seasonality Observations: Partly cloudy; warm (75°F); slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #2: TP-1 and TP-2; #3: Wood tanks; #4: Mill building. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Site was accessed by truck. Road for site begins at Great Divide Ski area (logging road). Tailings have eroded down Rawhide Gulch and are still approx. 1 foot deep in places and about 500 feet from residence at the mouth of the gulch.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Contour tailings pile and seed. Burn or stabilize mill building. Low metals content and near neutral pH in waste rock; possible to revegetate although steep.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BELMONT PA#: 25-167

Legal Description: T 12N ;R 6W ;Sec. 35 , SE1/4SW 1/4 1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 44' 45" Longitude: W 112° 19' 05"

Primary Drainage Basin and Code: Silver Creek/10030101
Secondary Drainage Basin: Rawhide Gulch

USGS Quadrangle map name(s): Greenhorn Mountain

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): James Salisbury, The Thomas Cruse Mining & Dev., 704 Parkview, Missoula, MT 59803. (406) 442-1576.

Relationship to other mines/sites in the area/district: The Bald Mountain mine is over the ridge from this site.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6200', Slope 20°, Aspect Southeast

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify) Logging

Area of disturbed/unvegetated lands? 3.5 acres.
Dimensions:

Predominant vegetation types: Lodgepole Pine, willow, aspen

Access: roads - good___,poor___,4wd X ,trail X .
Other logistical considerations (proximity to other sites). Millsite is off logging road which starts at Great Divide Ski Area. Upper portion of site can only be reached by hiking.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 37 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Tailings piles lie in the dry drainage Rawhide Gulch; water running off the site flows down Rawhide Gulch into perennial Silver Creek. Underlying bedrock is quartz diorite.

Mining/milling history, ore type/tenor, host rock, gangue: The Belmont lode was discovered in 1875. The Belmont Mill, a quartz separation mill (gravity concentrator), operated sporadically between 1878 and 1916. For much of the 1870's and 1880's the mill was the principal stamp facility within the Marysville Mining District. Gangue minerals for the Belmont Mine ore were quartz and calcite with sulfides absent or occurring only in small quantities.

Mine Operation?
Shafts - Yes___, No X, # ___, Comment
Adits - Yes X, No___, # 2, Comment Caved
Pits - Yes X, No___, # 5, Comment 2 prospect pits; 3 caved stopes; 2 are fenced completely, 1 with a 3-sided fence.
Placers - Yes___, No X, # ___, Comment
Other - Yes___, No X, # ___, Comment

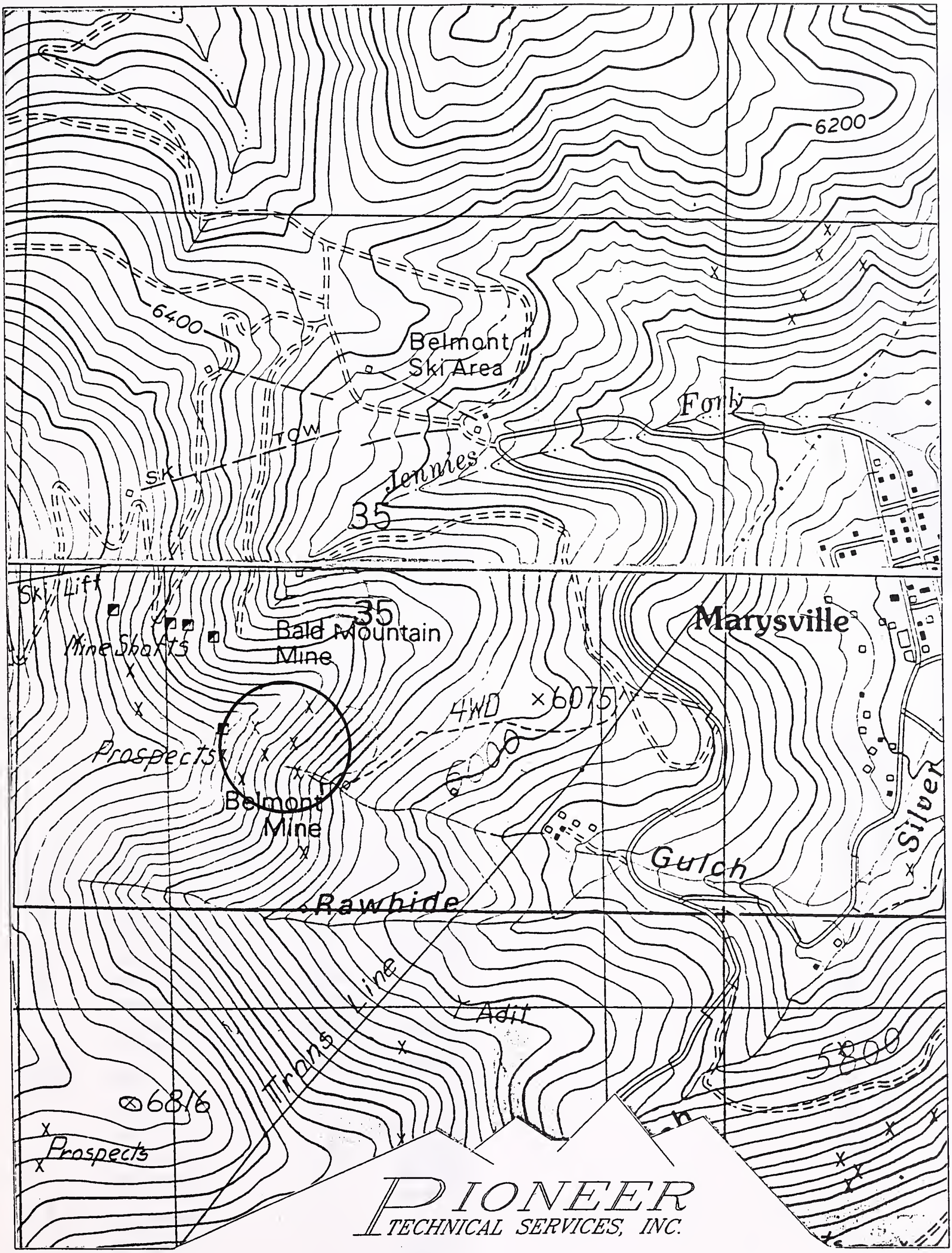
Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: 1878 to 1916

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Belmont Mine also principal stamp mill for Marysville district during 1870's and 1880's.

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Gravity separation

ll No.	Location	Depth	Yield	Static Water Level
M:66433	12N 06W 35	84.0	20.0	15.00
M:66434	12N 06W 35 ADB	120.0	15.0	20.00
M:66435	12N 06W 35 DDB	50.0	1.0	27.00
M:66436	12N 06W 35 DDB	50.0	0.0	0.00
M:66437	12N 06W 35 DDBC	0.0	60.0	75.00
M:66439	12N 06W 36	0.0	20.0	Flowing
M:66447	12N 06W 36	55.0	25.0	10.00
M:66443	12N 06W 36	0.0	0.0	0.00
M:66451	12N 06W 36	35.0	1.0	20.00
M:66445	12N 06W 36	55.0	25.0	11.00
M:66455	12N 06W 36	70.0	20.0	15.00
M:66449	12N 06W 36	45.0	25.0	0.00
M:66441	12N 06W 36	35.0	35.0	20.00
M:66440	12N 06W 36	50.0	0.0	20.00
M:66457	12N 06W 36	25.0	0.0	0.00
M:66448	12N 06W 36	32.0	30.0	8.00
M:66453	12N 06W 36	50.0	20.0	15.00
M:66438	12N 06W 36	52.0	38.0	25.00
M:66444	12N 06W 36	55.0	30.0	5.00
M:66452	12N 06W 36	25.0	0.0	20.00
M:66446	12N 06W 36	155.0	3.0	8.00
M:66442	12N 06W 36	35.0	35.0	20.00
M:66456	12N 06W 36	120.0	10.0	25.00
M:66450	12N 06W 36	12.0	0.0	0.00
66454	12N 06W 36	70.0	20.0	15.00
M:66458	12N 06W 36 A	25.0	0.0	0.00
M:66459	12N 06W 36 BACC	0.0	35.0	20.00
M:66460	12N 06W 36 BACC	25.0	35.0	20.00
M:66461	12N 06W 36 BD	200.0	1.0	58.00
M:121418	12N 06W 36 BDB	110.0	6.0	0.00
M:66462	12N 06W 36 BDB	160.0	10.0	40.00
M:66463	12N 06W 36 BDC	86.0	15.0	30.00
M:66465	12N 06W 36 BDC	100.0	20.0	15.00
M:66464	12N 06W 36 BDC	60.0	20.0	15.00
M:127905	12N 06W 36 CA	80.0	20.0	25.00
M:66466	12N 06W 36 DB	105.0	10.0	46.00
M:66467	12N 06W 36 DB	105.0	20.0	63.00

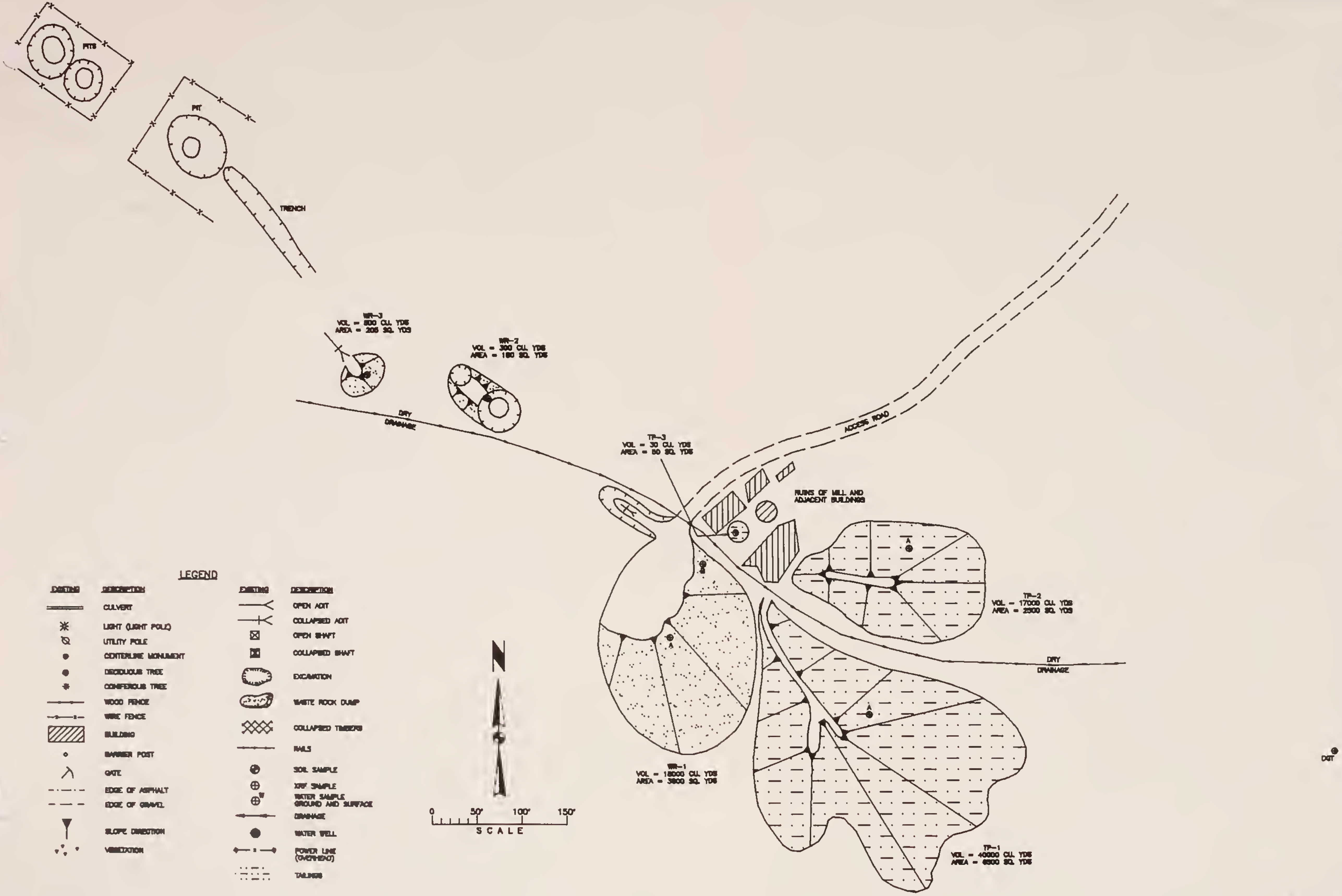


PIONEER
TECHNICAL SERVICES, INC.

BELMONT, P.A. NO. 25-167

T12N, R06W, SECTION 35

SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BELMONT PA# 25-167
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

PIONEER

DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

25-167.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 100% fine-grained sand

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): No stratification; depth appears to be 42+ feet, all of which appears to be light tan fine-grained sand.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundments, just two major piles of tailings with ravine (erosion channel) dividing them.

Comments on potential for mitigation: Appears to revegetate on their own in level areas. Tailing piles should be contoured and seeded.

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	40,000	East side of pile, profile; 0-10'	None	6.8 (D)	0.04	25-167-TP-1	08/19/93 1700	T-Metals, ABA
TP-1A-B	TAIL		East side of pile, profile; 10'-20'	None	6.8 (D)	0.04			
TP-1A-C	TAIL		East side of pile, profile; 20'-30'	None	6.8 (D)	0.03			
TP-1A-D	TAIL		East side of pile, profile; 30'-40'	None	6.85 (D)	0.02			
TP-1A-E	TAIL		East side of pile, profile; 40'-50'	None	7.0 (D)	0.03			
TP-1A-F	TAIL		East side of pile, profile; 50'-60'	None	7.0 (D)	0.03			
TP-2A-A	TAIL	17,000	East tailings pile, profile; 0-6'	None	6.8 (D)	0.025	25-167-TP-2	08/19/93 1705	T-Metals, ABA, Cyanide
TP-2A-B	TAIL		East tailings pile, profile; 6'-13.5'	None	6.8 (D)	0.025			
TP-2A-C	TAIL		East tailings pile, profile; 13.5'-21'	None	6.9 (D)	0.02			
TP-2A-D	TAIL		East tailings pile, profile; 21'-31'	None	6.9 (D)	0.03			
USS-1	OTH		Underlying soil 150' below toe of TP-1, below 1.5' of tails	None	5.9 (D)	0.04	N/A	N/A	XRF Analysis
DGT	TAIL	N/A	Approx. 350' from base of TP-1	None	6.0 (D)	0.05			
TP-3	TAIL	30	In south wood water holding tank with 40' diameter, composite; 6"-2'	Tank	6.9 (D)	0.025			
WR-1A	WR	18,000	Middle side	None	6.4 (D)	0.04	25-167-WR-1	08/19/93 1700	T-Metals, ABA
WR-1B	WR		East side	None	6.2 (D)	0.04			
WR-2	WR	300	Middle	None	6.6 (D)	0.03			
WR-3	WR	500	Middle	None	6.8 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Because of depth of tailings, holes were dug at 3 to 4' intervals down cut faces of each pond; composites over depth were taken from the appropriate holes. Tailings were uniform throughout both profiles. 25-167-TP-2 is composite of TP-2A-A through -2A-D, and TP-3. 25-167-TP-1 is composite of TP-1A-A through -1A-F. 25-167-WR-1 is composite of WR-1A and -1B, WR-2, and WR-3.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:____ Identification:________

Filled shafts: Yes___, No X, Number:____ Identification:________

Seeps/Springs: Yes___, No X, Number:____ Identification:________

Groundwater wells within 4 miles?: Yes X, No___;
Number of well logs: 312

Distance to nearest well used for drinking? Approx. 1/4 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X.
No water associated with the site; metal values of tailings at or nea background levels.

Other observations/notes: The Pipinich well was sampled 10-30-84 by Amax Exploration. The well is 750 feet from the tailings and is 75 feet deep. The report states no contamination found; although data is not available.

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Dry drainage cuts between TP-1 and TP-2; deposition of tailings has occurred for 1,000+ feet down the valley.

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): TP-1 and TP-2 erosion of tailings down dry drainage occurs during storm events.

Approximate Flood frequency? X 1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? Unknown
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 1,000+ feet

Surface water draining onto or through waste sources: Yes____, No X ,
Describe: Runoff only

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetlands, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No_____, Distance downstream (ft)? 1000+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Tailings are present to a depth of up to 1 foot approx. 750 feet from site across dry valley floor.

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 to 2 acres could be used at base of tailings ponds.

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Gangue contained calcite minerals.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1,000 feet down dry drainage

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	None	Dry	58,500	40,950	Yes	Moderate
TP-2	None	Dry	22,500	11,250	Yes	Moderate
WR-1	None	Dry	34,200	34,200	No	Low
WR-2	None	Dry	1,620	1,620	No	Low
WR-3	None	Dry	1,845	1,845	No	Low
TP-3	None	Dry	450	338	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:__________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments__________

Evidence of recreational use on site: Yes_X_, No___, Describe: Pop cans; shotgun shells

Accessibility - Fences, warning signs, closed roads? Need to go through ski area, or on private road (no gate); a rope cordons of lower part of site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes___, No_X_, Comment__________
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_3_, types and locations: Open stopes in upper part of site; one close to ridge line approx. 35 feet deep with a three-sided fence, and two on other side of ridge line with an unknown depth and is fenced.

Hazardous structures: Yes_X_, No___, Number_3_, types and locations: Mill building and two wooden vats 40 feet diameter x 10 feet high

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:__________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_3_, types and locations: Tailings piles are eroding, steep with unstable walls and some are undercut. WR-1 is steep, mostly unvegetated, and angle of repose.

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Mill building

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Belmont, Prepared by Daphne Digrindakis, October 28, 1982.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Belmont, Prepared by Northern Engineering and Testing, July 8, 1988.

MDSL/AMRB Files, Montana Cultural Resources Information System Form for the Belmont Claim.

Robert Peccia and Associates, Letter from Michelle Marsh to Edward Gensler, MDSL/AMRB, October 16, 1989.

USGS, Geology of Marysville Mining District, Montana, Professional Paper 57, Author Unknown, 1903.

USGS, Ore Deposits of the Helena Mining Region, Montana, Bulletin 527, Written by Adolph Knopf, 1913.

USGS, Topographic Map, Greenhorn Mountain, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

BELMONT
PA NO. 25-167

Belmont PA# 25-167
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 08/19/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-167-TP-1	28	30.2	1.0 UJ	1.61 J	2.87 J	56.8	6510	1.93	1190	2.38 U	48.4	10	230	NR
25-167-TP-2	32.2	36.2	0.7 UJ	1.85 J	2.61 J	38.1	6840	0.464	1520	3.54 J	38.1	5.74	208	<0.277
25-167-WR-1	19 J	26.5 J	0.4 U	3.07	4.46	35.8 J	10700 J	0.723 J	630 J	5.27	14.6 J	4.97 U	65.6 J	NR
BACKGROUND	38 J	239	0.5 UJ	8.2	14.1	49.7	19500	0.122	1000	15 J	80	4 J	153	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-167-TP-1	<0.01	0	74.3	74.3	<0.01	<0.01	0.01	0	74.3
25-167-TP-2	<0.01	0	74.4	74.4	<0.01	<0.01	<0.01	0	74.4
25-167-WR-1	<0.01	0	96.8	96.8	<0.01	0.01	0.01	0.31	96.5

LEGEND

TP1 – Composite of subsamples TP1A-A, 1A-B, 1A-C, 1A-D, 1A-E, and 1A-F.
TP2 – Composite of subsamples TP2A-A, 2A-B, 2A-C, 2A-D, and 3.
WR1 – Commposite of subsamples WR1A, 1B, 2, and 3.
BACKGROUND – From Empire Millsite (25-175-SS-1).

XRF ANALYSIS RESULTS

BELMONT
PA NO. 25-167

MDSL AMRB/PIONEER 4/9/93

Mine Name: Belmont PA# 25-167
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-167-DGT	319.132 *	9781.42	27563.3	677.113		1646.15	7812.84			151.054		127.056
25-167-SS-1		15596.5	17327.3	1965.54		2341.74	19274.5			173.891		395.054
25-167-TP1A-A		8704.33	40932.5	325.133 *		1493.47	5919.3		45.6931 *	127.791 *		161.914
25-167-TP1A-B		9296.29	33434.9	451.593		1125.71	6407.68		62.3132 *	197.828		120.706
25-167-TP1A-C		10852.8	35016.4	273.619 *		1448.22	7189.88		60.2012 *	183.963	39.7686 *	133.404
25-167-TP1A-D		10309.4	34473.2	406.254		1688.23	7823.81			195.935		
25-167-TP1A-E		9256.73	34947.7	385.42	141.008 *	1369.1	6531.02			142.253		137.269
25-167-TP1A-F		8231.09	30396.8	254.975 *		1465.9	5529.37			132.171 *	40.2458 *	118.938
25-167-TP2A-A		8506.55	25564.1	638.968		1859.97	9428.14		114.54 *	211.426	50.0987 *	87.6997
25-167-TP2A-B		9882.36	28259.9	425.818		894.356 *	7480.25			221.828	29.5758 *	109.32
25-167-TP2A-C		10259.1	29910.8	482.072		911.57 *	8185.58			185.463	37.1075 *	107.953
25-167-TP2A-D		10485.9	31506.1	511.174		807.657 *	7909.56			243.156	53.6672 *	112.253
25-167-TP-1-COMP		10001.1	44901.6	551.013		1261.08	7987.49			217.523		135.314
25-167-TP-2-COMP		9145.38	31136.1	415.145		1743.53	7327.17			167.046	48.2029 *	125.584
25-167-TP-3		8204.17	36954.1	515.411		762.674 *	9012.21			207.509		115.898
25-167-WR1-A		23547.9	13647.2	1160.33		1688.39	24627.7			86.2196 *	45.6991 *	302.276
25-167-WR1-B	572.688 *	19573.7	15365.4	1809.79		1413.73	24094.1			63.4762 *	36.553 *	401.143
25-167-WR-1-COMP		24350.4	51676.5	1567.5		1430.51	22344.7			103.307 *	35.1144 *	254.23
25-167-WR-2		28078.6	18994.7	1303.34		2065.98	23728.9		80.5557 *	116.548 *	48.5334 *	179.697
25-167-WR-3		29320.6	17320.6	966.134		2035.45	23611.1		81.7759 *	93.9011 *	63.3476 *	205.341

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-167-DGT	44.8298			32.7696 *	77.7464			255.296			
25-167-SS-1	161.397			22.7656 *	97.7849			927.276			9.49981 *
25-167-TP1A-A	37.6554	70.897 *		48.7043 *	72.2587			202.768			10.0664 *
25-167-TP1A-B	45.6638	71.7943 *		35.4983 *	71.9962			244.426			9.69325 *
25-167-TP1A-C	40.0878	62.5744 *		17.8664 *	73.7681		41.3602 *	201.21			10.0597 *
25-167-TP1A-D		66.6529 *		31.306 *	72.006			229.682			10.3943 *
25-167-TP1A-E	42.2163	80.9062 *		18.3376 *	69.5701			215.043			12.2422 *
25-167-TP1A-F	43.1211	55.8607 *		15.5004 *	64.098			192.719			13.4469 *
25-167-TP2A-A	72.7708	73.0885 *		42.146 *	74.386		44.7374 *	204.548	67.004 *		9.67891 *
25-167-TP2A-B	53.5601			24.1496 *	70.1024			212.461			5.98445 *
25-167-TP2A-C	57.1631				71.4772		49.6023 *	228.941			
25-167-TP2A-D	48.8228				74.0347			221.194			6.8398 *
25-167-TP-1-COMP	65.2271			46.0042 *	66.8913			250.115			
25-167-TP-2-COMP	47.2296				73.2102						
25-167-TP-3	63.5608	32.9317 *		60.0772 *	63.177		38.719 *	192.566			
25-167-WR1-A	101.398			17.5688 *	215.469			860.46			7.70961 *
25-167-WR1-B	118.475	44.46 *			169.67			994.585			10.7908 *
25-167-WR-1-COMP	140.137			27.7878 *	221.129			793.182			6.98314 *
25-167-WR-2	134.891	39.2161 *		37.0431 *	243.342			719.314			12.7338 *
25-167-WR-3	147.014	41.578 *		36.3948 *	269.251			744.532			11.6671 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BELMONT
PA NO. 25-167

AIMSS SCORESHEET

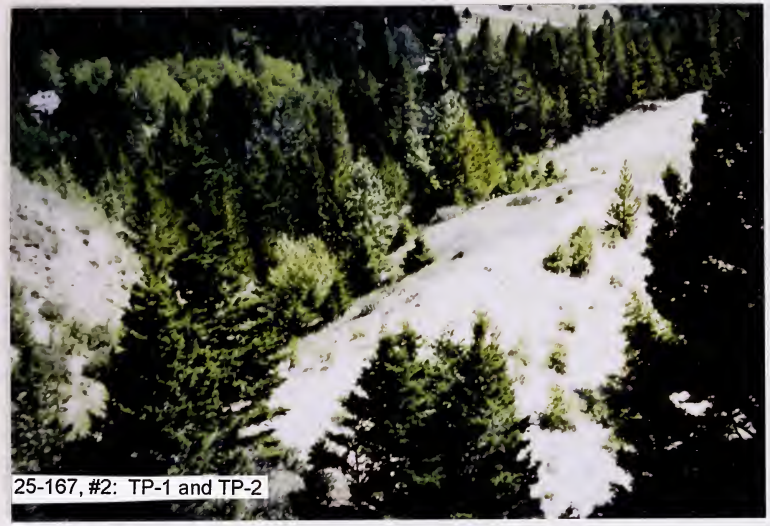
SITE NAME: BELMONT
PA NUMBER: 25-167

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.291
6	GW - TARGETS	WELLS - 1 MI. x 2.5		92.5
7		WELLS - 1 TO 4 MI		275
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	372.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	21680
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.361
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	260
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	150
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	14
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	20
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	2
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.22**

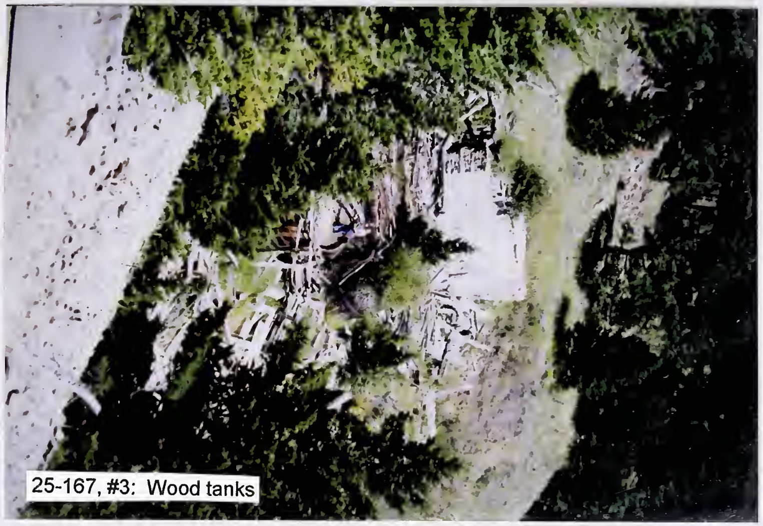
SITE NAME: BELMONT
PA NUMBER: 25-167

SITE SAFETY

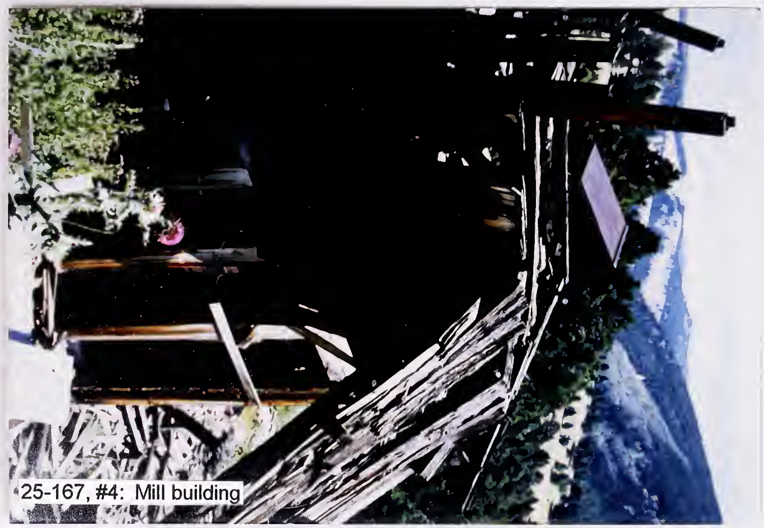
LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	300
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	120
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	420
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	20
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**42.00**



25-167, #2: TP-1 and TP-2



25-167, #3: Wood tanks



25-167, #4: Mill building

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: PIEGAN GLOSTER MILLSITE PA#: 25-172

Date: September 1, 1993 Time: 0815

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: Flammang, S. Babits, Bullock;
Pioneer
Pierson; TD&H

Visitors: Hunters

Weather/Seasonality Observations: Partly cloudy to overcast with rain; warm (60°F); slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #20: Mill building; #21: TP-1A; #22: TP-2; #23: TP-4; #24: TP-3.
Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Possibly reprocess tailings for lead and zinc.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): PIEGAN GLOSTER MILLSITE PA#: 25-172

Legal Description: T 12N ;R 6W ;Sec. 21 & 27, ___1/4___1/4___1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 46' 12" Longitude: W 112° 20' 43"

Primary Drainage Basin and Code: Little Prickly Pear/10030101
Secondary Drainage Basin: Piegan Creek

USGS Quadrangle map name(s): Canyon Creek

Mine Type/Commodities: Millsite/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): LRG Enterprises, P.O. Box 452, Canyon Creek, MT 59633.

Relationship to other mines/sites in the area/district: Many mines in the area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5000', Slope 25°, Aspect North

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 9 acres.
Dimensions:

Predominant vegetation types: Aspen, pine, grasses, clover

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 7 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies at the headwaters of Piegan Creek, which flows north through the site until reaching Little Prickly Pear Creek two miles from the site. Country rock is quartz diorite, but the contact, metamorphic hornstones, are found nearby.

Mining/milling history, ore type/tenor, host rock, gangue: The mine operated from 1906 to 1911; unknown history on the mill. Gangue is mainly quartz with some calcite.

Mine Operation?

Shafts - Yes___, No X , # _____, Comment
Adits - Yes___, No X , # _____, Comment
Pits - Yes___, No X , # _____, Comment
Placers - Yes___, No X , # _____, Comment
Other - Yes___, No X , # _____, Comment

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Unknown

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Fine sand, silt and clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-1 is 6 feet deep, TP-2 and TP-3 are 30 feet deep, and TP-4 is approximately 13 feet deep.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Berms are in place on all of the tailings piles.

Comments on potential for mitigation: Reprocess

SOURCE INV[illegible]TORY FORM

SAMPLERS: M. Babits, S. Babits, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	420	Center of TP-1A near berm; 0-1.5', sand	Berm	6.8 (D)	0.04	25-172-TP-1	09/01/93 2000	T-Metals, ABA, CN-
TP-1A-B	TAIL		1.5-6', silt	Berm	6.2 (D)	0.04			
TP-1A-C	TAIL		Underlying soil	Berm	6.4 (D)	0.04			
TP-1B-A	TAIL		Center of TP-1B near berm; 0-3', sand	Berm	6.4 (D)	0.04			
TP-1B-B	TAIL		Underlying soil	Berm	6.4 (D)	0.04			
TP-2A-A	TAIL	102,000	Center at berm, on northeast side, profile; 0-8', silt	Berm	6.8 (D)	0.04	25-172-TP-2	09/01/93 2010	T-Metals, ABA, CN-
TP-2A-B	TAIL		8-16', silt	Berm	6.8 (D)	0.03			
TP-2A-C	TAIL		16-24', silt	Berm	6.6 (D)	0.03			
TP-2A-D	TAIL		24-36', silt	Berm	6.7 (D)	0.02			
TP-2B-A	TAIL		Middle of TP-2; 0-5', sand	Berm	5.6 (D)	0.025			
TP-2B-B	TAIL		Silty sand	Berm	5.6 (D)	0.02			
TP-2B-C	TAIL		Clay	Berm	5.6 (D)	0.025			
TP-3A-A	TAIL	133,400	North end of TP-3, east side of creek, profile; 0-7'	Eroding Berm	5.3 (D)	0.04	25-172-TP-3	09/01/93 2015	T-Metals, ABA, CN-
TP-3A-B	TAIL		7-14'	Eroding Berm	5.5 (D)	0.05			
TP-3A-C	TAIL		14-21'	Eroding Berm	4.6 (D)	0.05			
TP-3A-D	TAIL		21-28'	Eroding Berm	4.3 (D)	0.05			
TP-3B-A	TAIL		Middle of TP-3, east side of creek, profile; 0-6'	Eroding Berm	4.0 (D)	0.05			
TP-3B-B	TAIL		6-12'	Eroding Berm	4.7 (D)	0.06			
TP-3B-C	TAIL		12-18'	Eroding Berm	4.1 (D)	0.05			
TP-4A-A	TAIL	100,000	Pile above and east of TP-2; sand	Berm	4.3 (D)	0.05			
TP-4A-B	TAIL		Fine sand	Berm	4.7 (D)	0.06			
TP-4A-C	TAIL		Silt and clay	Berm	4.1 (D)	0.05			
SS-1	BKGRND	N/A	Background soil near TP-2	N/A	6.2 (D)	0.04	25-172-SS-1	09/01/93 1410	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-172-TP-1 is composite of TP-1A-A and -1A-B and TP-1B-A. 25-172-TP-2 is composite of TP-2A-A through -2A-D, TP-2B-A through -2B-C, and TP-4A-A through -4A-C. 25-172-TP-3 is composite of TP-3A-A through -3A-D and TP-3B-A through -3B-C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:____ Identification:________

Filled shafts: Yes___, No X, Number:____ Identification:________

Seeps/Springs: Yes___, No X, Number:____ Identification:________

Groundwater wells within 4 miles?: Yes X, No___;
Number of well logs: 317

Distance to nearest well used for drinking? 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X, Unlikely____.
Very large uncontained source with elevated metals with a creek flowing through.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Piegan Creek

Dry streambeds: Yes X , No ___, Name(s): Unnamed drainages

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-2 and TP-3 in Piegan Creek; TP-4 in unnamed dry drainage.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.33 during investigatio
High Flow: 1.5 cfs , Average Flow: 0.3 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: TP-2 and TP-3 have Piegan Creek flowing through.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, irrigation, wetland, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 2 mi. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings noted in Piegan Creek until its confluence with Little Prickly Pear Creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: M. Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient in Piegan Creek below confluence of two tributaries	8.0	250	227	7.5	168	0.33 cfs (M)	25-172-SW-1	09/01/93 0945	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-1	SE	Upgradient in Piegan Creek below confluence of two tributaries	N/A	N/A	N/A	N/A	N/A	N/A	25-172-SE-1	09/01/93 0945	T-Metals, CN-
SW-2	SW	Downgradient in Piegan Creek below TP-3 and before placer	8.27	430	241	NM	197	0.275 cfs (M)	25-172-SW-2	09/01/93 1000	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-2	SE	Downgradient in Piegan Creek below TP-3 and before placer	N/A	N/A	N/A	N/A	N/A	N/A	25-172-SE-2	09/01/93 1000	T-Metals, CN-
SW-3	SW	Tributary above SW-1 that runs west to east below the mill	7.9	270	380	7.3	NM	NM	N/A	N/A	Field Parameters
SE-3	SE	500 feet downgradient of TP-3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SW-4	SW	Tributary above SW-1 that runs east to west	8.2	240	250	7.6	NM	NM	N/A	N/A	Field Parameters
SE-4	SE	1,000 feet downgradient of TP-3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 20 acres

Wetlands present: Yes X , No___, Describe: Streamside

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	None	Partial	17,100	0	Yes	Low/None
TP-2	None	Partial	183,600	165,240	Yes	Moderate
TP-3	None	Partial	156,600	140,940	Yes	Moderate
TP-4	None	Partial	67,500	60,750	Yes	Moderate

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe: Off-road vehicle tracks

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes_X_, No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No_X_, Comment____

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _2_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:____

Hazardous structures: Yes_X_, No___, Number_1_, types and locations: Mill building

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____

Fire and/or Explosion hazards: Yes_X_, No____, Explain: Wood mill building

Montana Bureau of Mines and Geology
Water Well Log Data

11/01/1993

Well No.	Location	Depth	Yield	Static Water Level
M:66423	12N 06W 16	12.0	20.0	0.00
M:66424	12N 06W 16 BB	24.0	0.0	0.00
M:66425	12N 06W 17	125.0	2.0	42.00
M:66426	12N 06W 17 AA	25.0	5.0	0.00
M:66427	12N 06W 17 AB	10.0	70.0	0.00
M:66428	12N 06W 17 AC	46.0	70.0	12.00
M:66429	12N 06W 17 BD	3.0	70.0	Flowing

Bibliography

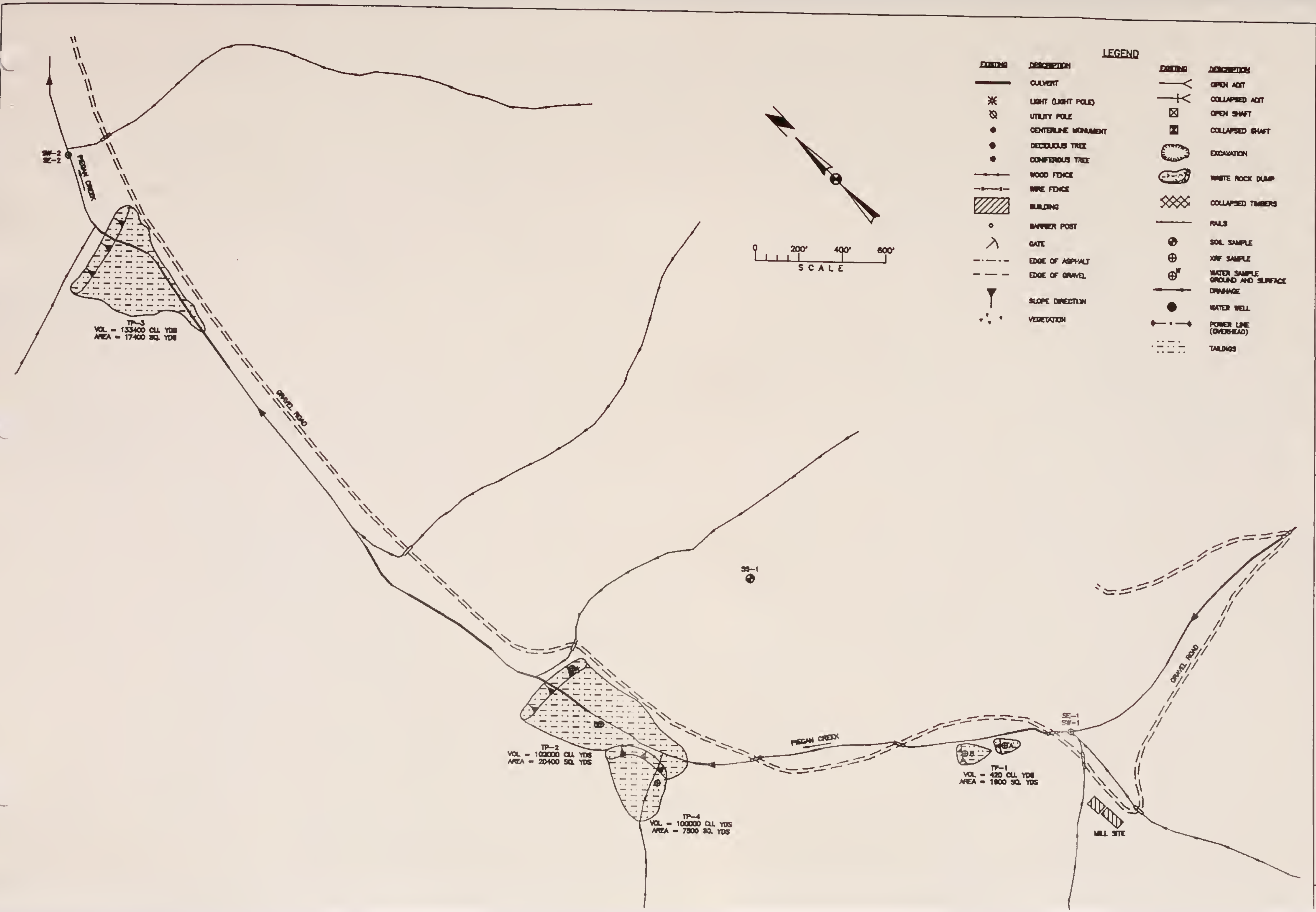
MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Piegan Gloster Millsite, Prepared by Northern Engineering and Testing, July 6, 1988.

USGS, Ore Deposits of the Helena Mining Region, Montana, Bulletin 527, Written by Adolph Knopf, 1913.

USGS, Topographic Map, Canyon Creek, Montana, 7 1/2 minute Quadrangle, 1968.



DRAWN WWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

PIEGAN GLOSTER MILL PA# 25-172
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

LABORATORY ANALYTICAL DATA

PIEGAN GLOSTER MILLSITE
PA NO. 25-172

MDSL AMRB/PIONEER 4/9/93

Piegan Gloster Mill PA# 25-172
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 09/01/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-172-SE-1	9.34 U	43.1 J	1.8 U	2.82 J	8.39 J	26 JX	9170	6 JX	225	4.26 U	102	12.4 UJ	119 J	0.464 U
25-172-SE-2	33.1 J	148 J	2.5	3.47 J	7.34 J	83 JX	10700	1.62 JX	2670	8.61 J	698	6.44 UJ	865 J	0.339
25-172-TP-1	49 J	59.3 J	0.9 U	3 J	3.24 J	45.7 JX	11100	1.17 JX	537	2.14 U	112	6.21 UJ	400 J	0.919
25-172-TP-2	47.5 J	179 J	4.3	3.39 J	8.52 J	157 JX	11900	0.165 JX	3820	7.71 J	1290	6.38 UJ	1620 J	9.96
25-172-TP-3	66.5 J	271 J	7.7	4.76 J	11.3 J	272 JX	14000	0.274 JX	5110	10.1 J	1940	6.89 J	2620 J	7.92
BACKGROUND	33.3 J	150 J	0.9 U	6.26 J	14.3 J	35.8 JX	14700	0.367 JX	729	10.6 J	34.4	6.4 UJ	83.1 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-172-TP-1	<0.01	0	28.6	28.6	<0.01	<0.01	0.01	0	28.6
25-172-TP-2	0.04	1.25	77.3	76	<0.01	0.02	0.03	0.62	76.7
25-172-TP-3	0.07	2.19	102	99.6	0.02	0.01	0.04	0.31	102

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-172-SW-1	5.42 J	36.9	2.57 U	9.7 U	6.83 U	9.87 J	243 JX	0.12 U	10.8	12.7 U	5.06 J	30.7 U	7.57 U	184
25-172-SW-2	6.58 J	53.2	2.57 U	9.7 U	9.57 J	4.6 J	118 JX	0.12 U	50.2	12.7 U	13.6 J	30.7 U	29.3	219

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-172-SW-1	202	< 5	18	0.11	< 0.005
25-172-SW-2	218	< 5	20	< 0.05	< 0.005

LEGEND

SE1 - Upgradient in Piegan Creek below confluence of 2 tributaries.
SE2 - Downgradient in Piegan Creek below tailings pond 3, before placer.
TP1 - Composite of subsamples TP1A-A, 1A-B, and 1B-A.
TP2 - Composite of subsamples TP2A-A through 2A-D, 2B-A through 2B-C, and 4A through 4C.
TP3 - Composite of subsamples TP3A-A, 3A-B, 3A-C, 3A-D, 3B-A, 3B-B, and 3B-C.
BACKGROUND - From the Piegan Gloster Mill (25-172-SS-1).
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

PIEGAN GLOSTER MILLSITE
PA NO. 25-172

MDSL AMRB/PIONEER 4/9/93

Mine Name: Piegan Gloster PA# 25-172
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-172-SE-3			29929.8	663.308		3226.82	10272		113.645 *	1187.71		60.0025
25-172-SE-4			27371.3	749.992		2680.66	9447.03		129.278 *	1311.67		61.0503
25-172-SS-1			10091.2	1519.92	141.538 *	1199.38	19865.6			143.188 *	63.4488 *	69.8013
25-172-TP1A-A		17346.8	6723.36	491.026	206.215 *	492.751 *	8066.67			213.635		114.75
25-172-TP1A-B			16581.9	953.57		1176.66	14390.4			471.275	72.9299 *	136.959
25-172-TP1A-C			9152.75	1622.95			17715.9			556.132	43.5136 *	145.384
25-172-TP1B-A			5377.01	586.905		396.007 *	11296.6			248.773	43.7029 *	138.256
25-172-TP1B-B			14005.6	1209.11	155.275 *	732.758 *	13721.9			633.125	52.6083 *	108.473
25-172-TP2A-A			20713.8	551.485	125.335 *	2997.4	9084.83		97.8261 *	982.689		52.1576
25-172-TP2A-B			25825.8	700.103		3469.69	11036		110.642 *	1496.73		62.5639
25-172-TP2A-C			27317.3	619.741		4060.15	11750.8		96.3555 *	1505.04		64.9905
25-172-TP2A-D			24482.3	646.833	126.741 *	3914.23	11430.8		110.616 *	1396.6		62.6273
25-172-TP2B-A			27089.7	711.779		3686.04	11531.2		108.574 *	1359.69		67.1241
25-172-TP2B-B			24085.4	608.075	133.796 *	2837.37	10708		66.2465 *	1267.86		57.6786
25-172-TP2B-C			31665.5	1123.88		3931.99	15229.4		119.62 *	2104.41		65.3427
25-172-TP3A-A			30800.9	898.825		3408.94	13636.6		238.213	2640.11		63.4375
25-172-TP3A-B			33102.5	833.243		3732.83	12993.8		173.625 *	1333.5		63.4797
25-172-TP3A-C			37120.7	879	179.256 *	5227.17	12944.3		168.11 *	1224.06		58.972
25-172-TP3A-D			27012.2	659.817		4070.39	11431.8		169.881 *	1659.3		62.164
25-172-TP3B-A			22287.4	604.811	133.819 *	4456.76	12443.3		252.456	2651.56		53.8645
25-172-TP3B-B			20788.4	830.464		2277.25	12221.7		206.892	2226.31		44.4402
25-172-TP3B-C			25879.6	771.642	142.04 *	4033.5	12684.5		195.536	2510.54		59.8919
25-172-TP4-A			23905.9	712.615		6462.7	11884.1		77.0942 *	906.926		83.0424
25-172-TP4-B			6802.11	385.919 *	178.693 *	799.904 *	6693.94		59.4239 *	329.658		74.7858
25-172-TP4-C			20998.8	504.541		6058.32	9163.89		78.5224 *	816.729		65.6287
25-172-TP-1-COMP			8644.43	863.231		655.21 *	13055.6			410.498	41.9315 *	133.702
25-172-TP-2-COMP			27912.4	822.565		4060.62	12991.3		108.395 *	1367.9		80.812
25-172-TP-3-COMP			37727.7	1214.25		4597.11	14581.8		211.136	2800.07		62.6317

Mine Name: Piegan Gloster PA# 25-172
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-172-SE-3	94.5172			915.423	125.58			366.161	83.605 *		
25-172-SE-4	84.0152			1074.17	129.9			348.858			
25-172-SS-1	207.341			31.8024 *	94.2406			474.803			
25-172-TP1A-A	50.2684			85.2232	125.074			548.134		12.1057 *	
25-172-TP1A-B	57.882			104.089	181.917			609.19	80.4461 *		
25-172-TP1A-C	207.419			16.7701 *	124.037			733.622			
25-172-TP1B-A	53.3761			57.328 *	170.051			477.122	80.2763 *		
25-172-TP1B-B	152.128			27.1448 *	111.513			428.035	55.0316 *		
25-172-TP2A-A	77.8729			832.842	113.176		32.2895 *	414.141			
25-172-TP2A-B	97.2357			1253.84	146.731			517.471	61.2368 *		
25-172-TP2A-C	106.359			1229.26	149.652			564.643			
25-172-TP2A-D	95.2011			1107.68	136.817			470.876			
25-172-TP2B-A	104.161			771.867	159.659			429.456			
25-172-TP2B-B	86.9128			969.897	139.988		37.5321 *	584.301			
25-172-TP2B-C	116.004			908.718	170.055			804.745	76.9577 *		
25-172-TP3A-A	135.946			1908.15	195.14			672.299	78.3325 *		
25-172-TP3A-B	127.401			918.831	187.975			680.058			
25-172-TP3A-C	124.895			988.179	176.944			690.961			
25-172-TP3A-D	122.98			1405.98	166.083			683.662			
25-172-TP3B-A	107.02			2003.83	174.218			498.796	68.3003 *		
25-172-TP3B-B	111.981			1501.74	163.123			564.354			
25-172-TP3B-C	108.883			1765.21	180.853			696.743			
25-172-TP4-A	72.3756			578.676	134.551		36.5084 *	504.448	60.6412 *		
25-172-TP4-B	53.6007			158.73	109.325		33.5663 *	539.605			
25-172-TP4-C	67.1008			495.987	123.112		45.5273 *	445.864			
25-172-TP-1-COMP	51.6765			129.545	179.371			586.939			
25-172-TP-2-COMP	106.014			1027.29	160.994			743.407	125.206 *		
25-172-TP-3-COMP	126.578			1889.31	190.66			829.73	88.7662 *		11.9122 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

PIEGAN-GLOSTER MILLSITE
PA NO. 25-172

AIMSS SCORESHEET

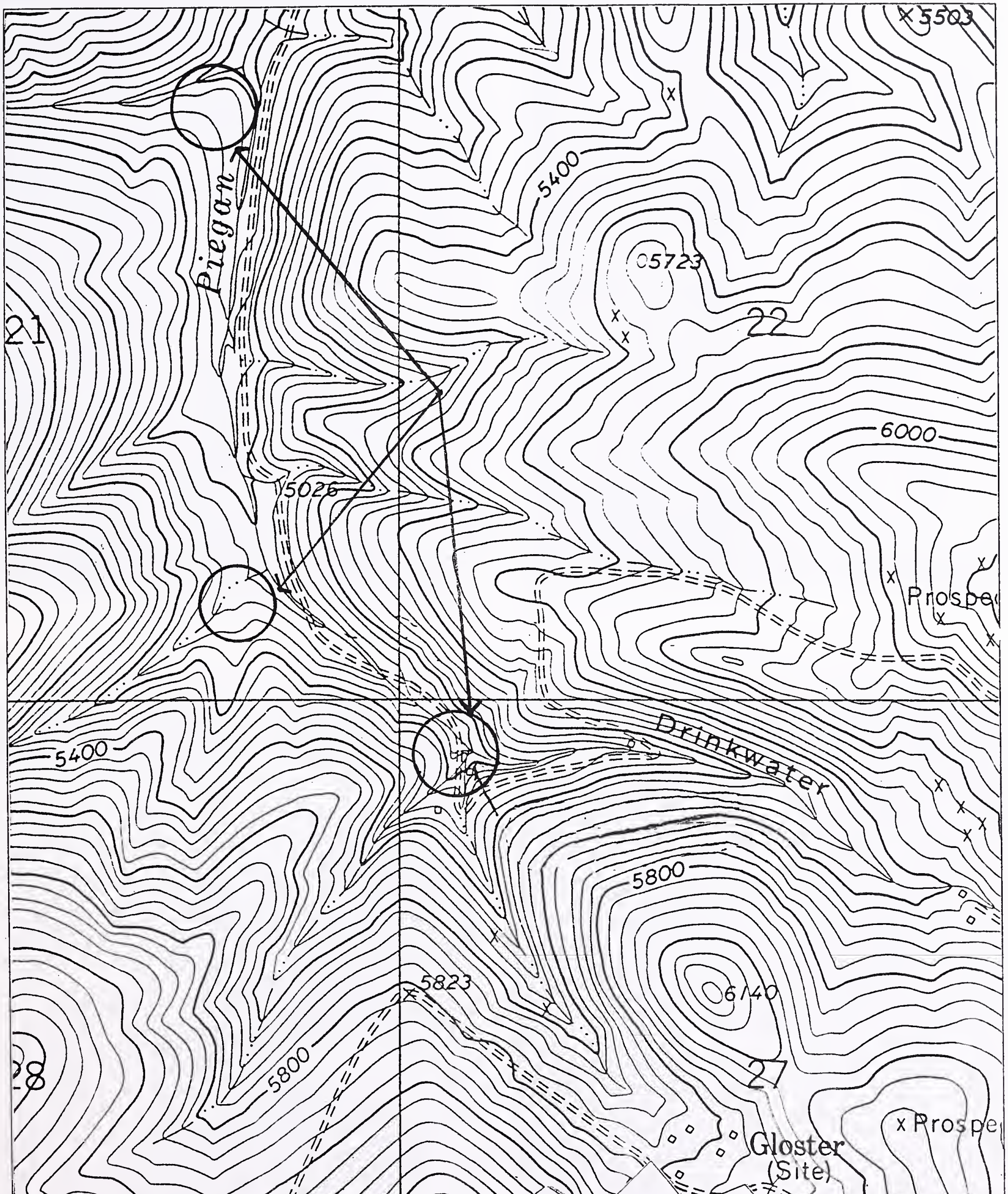
SITE NAME: PIEGAN GLOSTER MILL
PA NUMBER: 25-172

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	322.363
6		WELLS - 1 MI. x 2.5		17.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		310
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	327.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	42229553
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	354.849
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		11
18		WETLANDS		10
19	SW - TARGETS	FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	38
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	9438983
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.548
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	9314
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.223
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	2901
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**516.81**

SITE NAME: PIEGAN GLOSTER MILL
PA NUMBER: 25-172

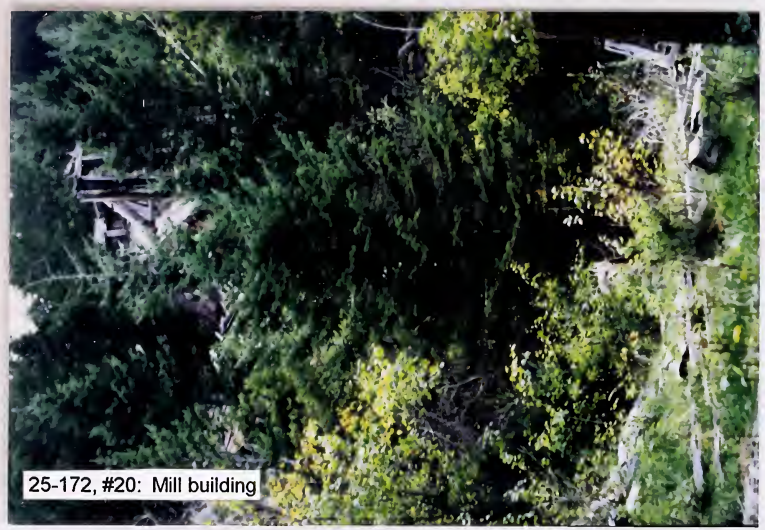
SITE SAFETY

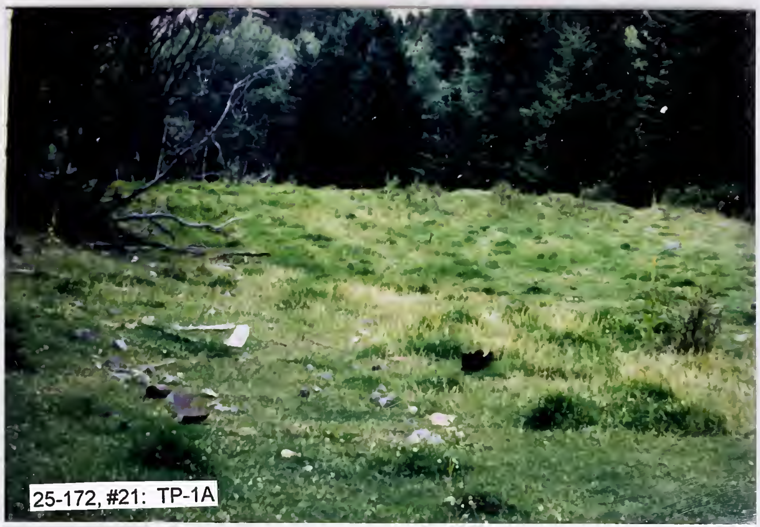
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	40
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**4.80**

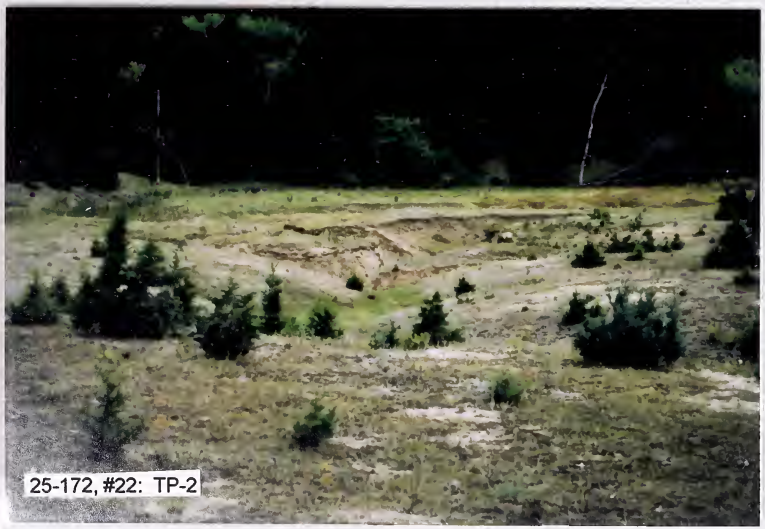


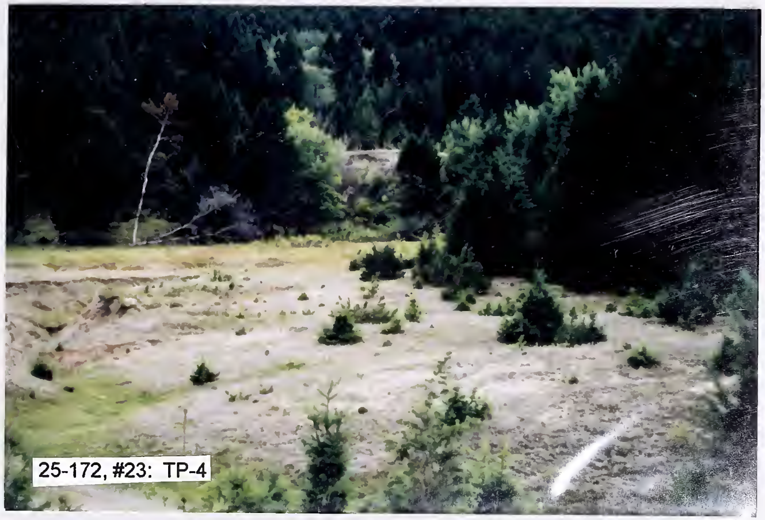
PIONEER
TECHNICAL SERVICES, INC.

PIEGAN–GLOSTER MILL, P.A. NO. 25–172
T12N, R06W, SECTIONS 21, 27
SCALE: 1" = 1000'

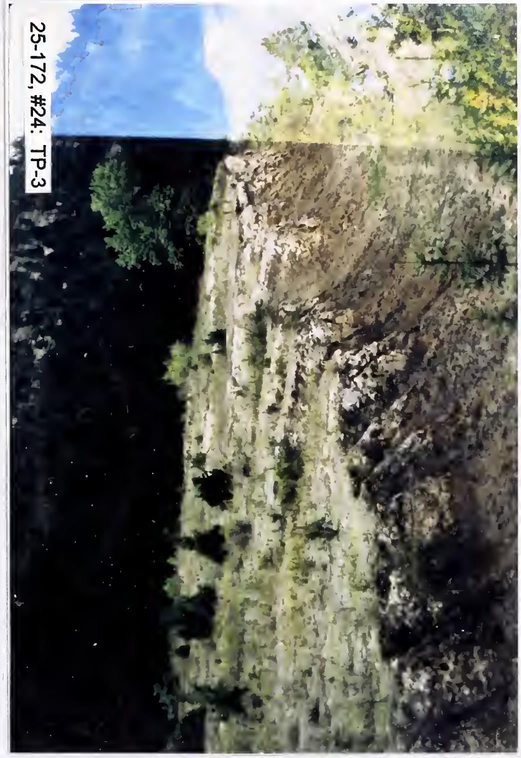

25-172, #20: Mill building


25-172, #21: TP-1A


25-172, #22: TP-2


25-172, #23: TP-4

Piegan
25-172
#20


25-172, #24: TP-3

Piegan
25-172
#21

Piegan
25-172
#23

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: EMPIRE MILLSITE **PA#:** 25-175

Date: June 9, 1993 **Time:** 1515

Field Team Leader: Bullock/Babits, Pioneer

Sampling Personnel: Flammang, Lasher, Clark;
Pioneer
Pierson; TD&H

Visitors: None

Weather/Seasonality Observations: Warm (60°F); partly cloudy; breezy; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #1: New dam and flow gates on Empire Creek; #2: Second impoundment upgradient of new dam; #3: Mill building. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** N/A

Other Hazardous Materials/Substances Present: Mill building contains: 1/3 of a 55-gallon drum containing oily black sludge with debris; holes in bottom of barrels show evidence of leaking as does the soil; and, 5 full 55-gallon drums of white powdery material (possibly lime); 3 are open (enough to fill a 2 gallon bucket has spilled on ground and solidified), and 2 are upright, but have holes in side, which contents have spilled from.

General Comments on Potential Remedial Alternatives: Study water treatment requirements/alternatives. Stabilize wastes inplace, if possible, or remove to dry permanent repository; only minimal impacts to water quality were observed.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): EMPIRE MILLSITE PA#: 25-175

Legal Description: T 12N ;R 6W ;Sec. 32,33 , ___ 1/4 ___ 1/4 ___ 1/4

County: LEWIS & CLARK Mining District: MARYSVILLE

Latitude: N 46° 45' 25" Longitude: W 112° 21' 45"

Primary Drainage Basin and Code: Little Prickly Pear Crk./10030101
Secondary Drainage Basin: Empire Creek

USGS Quadrangle map name(s): Canyon Creek and Granite Butte

Mine Type/Commodities: Millsite/Gold, Silver, Lead, Zinc

Activity Status: Active ___, Inactive/Exploration ___, Abandoned X .

Ownership status: Known YX N __; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Harris Peterson, Hwy 81 North Box 1276, Grand Forks, ND 58206.

Relationship to other mines/sites in the area/district: Milled ore from the Empire Mine and possibly others in the area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5600', Slope 0°-5°, Aspect Western

Land use: Mining ___, Recreational X , Residential ___, Urban ___, Agricultural ___, Other(Specify) ___

Area of disturbed/unvegetated lands? Approx. 15 acres.
Dimensions: Site dimensions are approx. 3,600 feet x 500 feet.

Predominant vegetation types: Lodgepole pine, willow, wetland grasses

Access: roads - good ___, poor X , 4wd ___, trail ___.
Other logistical considerations (proximity to other sites). ___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in drainage of Empire Creek which flows west through the tailings ponds. Empire Creek meets perennial Lost Horse Creek approx. 1 mile below the mine site. Lost Horse Creek flows north to confluence with Little Prickly Pear Creek 3 miles beyond that. The site is underlain by alluvium and Precambrian shales.

Mining/milling history, ore type/tenor, host rock, gangue: Empire Mill is associated with Empire Mine. Empire Mine was developed on a fissure filling quartz veins in Spokane Formation or Empire Shale. Ore minerals were Au, Ag, galena, sphalerite, oxidized lead and zinc minerals. Operated from 1887 to 1893 and was being developed by a one-person operation in 1967.

Mine Operation?
Shafts - Yes___, No X, # _____, Comment
Adits - Yes___, No X, # _____, Comment
Pits - Yes___, No X, # _____, Comment
Placers - Yes___, No X, # _____, Comment
Other - Yes___, No X, # _____, Comment

Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: 1887 to 1893

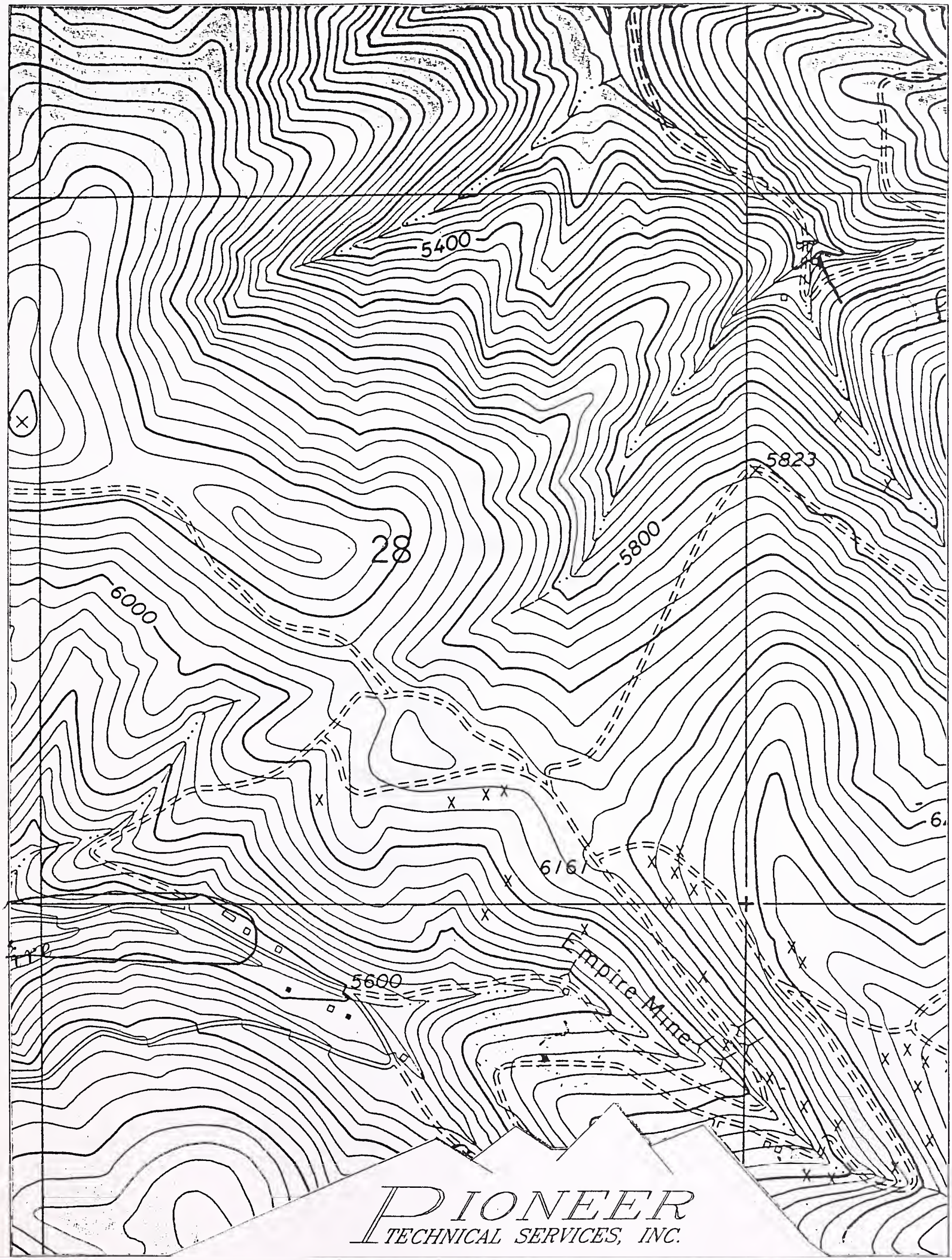
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Empire Mine and possibly others

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? 200 tons/day mill on the property, process unspecified in the literature.

Montana Bureau of Mines and Geology
Water Well Log Data

10/29/1993

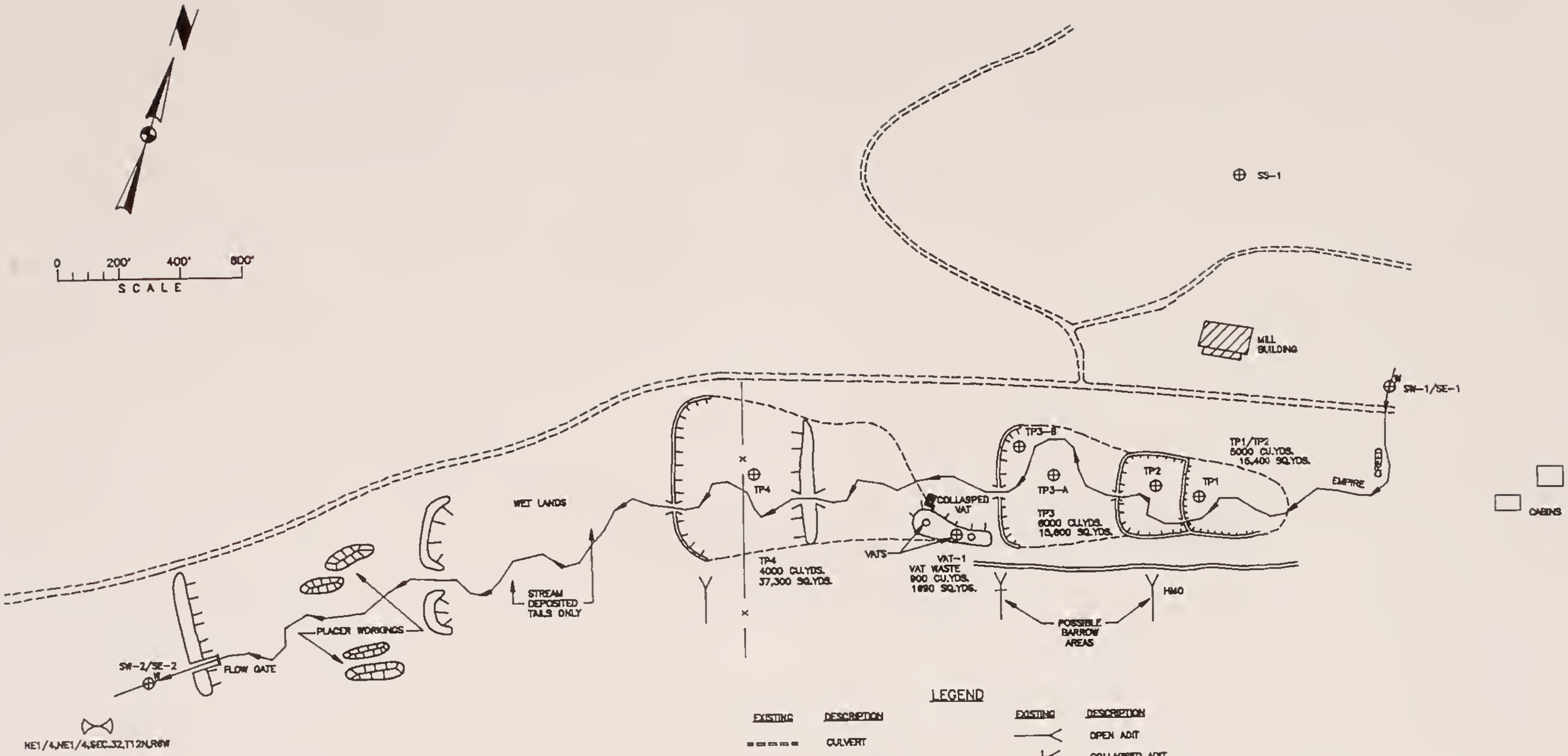
Well No.	Location	Depth	Yield	Static Water Level
[illegible]947	12N 06W 32 ABD	6.0	0.0	530.00
M:66432	12N 06W 32 ACAB	303.0	28.0	5.00



EMPIRE MILLSITE, P.A. NO. 25-175

T12N, R06W, SECTIONS 32, 33

SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
	CULVERT		OPEN ADIT
✳	LIGHT (LIGHT POLE)		COLLAPSED ADIT
⦰	UTILITY POLE	⊠	OPEN SHAFT
●	CENTERLINE MONUMENT		COLLAPSED SHAFT
●	DECIDUOUS TREE		EXCAVATION
✸	CONIFEROUS TREE		WASTE ROCK DUMP
	WOOD FENCE		COLLAPSED TIMBERS
	WIRE FENCE		RAILS
▨	BUILDING	⊕	XRF SAMPLE
○	BARRIER POST	⊕W	WATER SAMPLE GROUND AND SURFACE
	GATE		DRAINAGE
	EDGE OF ASPHALT	●	WATER WELL
	EDGE OF GRAVEL		
▼	SLOPE DIRECTION		

DRAWN JTP DATE 13 JULY 93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
EMPIRE MILL PA# 25-175
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-175.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 60% sand, 20% clay, 20% silt

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Clay on top, followed by brown sand, then silt; in some places natural soil is reached, and in others layers of sand. Depths range from 4' to 15' with a 7' depth at the TP-4 berm.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Partial; tailings are dry down to approx. 3 feet, then wet.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): All impoundments are breached except the last one at approx. 3,440', which is new and has a flow gate.

Comments on potential for mitigation: Isolate from active drainage and shallow groundwater.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Babits, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A	TAIL	5,000	East end of site, borehole; 0-3'	Breached dam	5.9 (D)	0.04			
TP-1B	TAIL		3-6'	Breached dam	NM	NM			
TP-2A	TAIL		North of stream, center, borehole; 0-10", brown clay with silt	Breached dam	7.68 (S)	0.03	25-175-TP-1	06/09/93 1900	T-Metals, ABA, CN-
TP-2B	TAIL		11"-3.5', coarse brown sand	Breached dam	3.7 (D)	0.04			
TP-2C	TAIL		3.5-4', gray and blue saturated silty clay	Breached dam	3.6 (D)	0.04			
TP-3-1A	TAIL	6,000	South of stream, east edge, borehole	Breached dam	< 3.5 (D)	0.04			
TP-3-1B	TAIL		South of stream, east edge, borehole	Breached dam	< 3.5 (D)	0.04			
TP-3-1C	TAIL		South of stream, east edge, borehole	Breached dam	7.79 (S)	0.04	25-175-TP-2	06/09/93 1900	T-Metals, ABA, CN-
TP-3-1D	TAIL		South of stream, east edge, borehole	Breached dam	7.50 (S)	0.03	25-175-TP-3	06/09/93 1900	T-Metals, ABA, CN-
TP-3-2A	TAIL		North of stream, northwest corner, borehole; 0-2.5', brown clay	Breached dam	< 3.5 (D)	0.04			
TP-3-2B	TAIL		2.5-5.5', dry and wet coarse brown sand	Breached dam	< 3.5 (D)	0.04			
TP-3-2C	TAIL		5.5-11.5', brown silt and sand	Breached dam	5.0 (D)	0.04			
TP-3-2D	TAIL		12.5-15', brown/gray sand	Breached dam	5.6 (D)	0.04			
TP-4	TAIL	4,000	Lowest pile, center of east side; 0'-4', medium tan sand	Breached dam	6.0 (D)	0.05			
SS-1	BKGRND	N/A	Background soil above mill building approx. 100' down from top of hill	N/A	N/A	N/A	25-175-SS-1	06/09/93 1730	T-Metals
VAT-1	TAIL	900	Sample from east collapsed vat	Collapsed wood vat	N/A	N/A	N/A	N/A	N/A

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-175-TP-1 is composite of TP-2A and TP-3-2A. 25-175-TP-2 is composite of TP-3-1C and TP-3-2B and 3-2C. 25-175-TP-3 is composite of TP-3-1D and TP-3-2D. Volume for TP-1 includes TP-2.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map o topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_317_

Distance to nearest well used for drinking?_Possible well approx. 1/4 to 1/2 mile upgradient. Nearest downgradient well is approx. 2.5 miles._

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____,Probable_X_, Possible____, Unlikely____.
Tailings are contacting shallow alluvial groundwater and metal values are elevated well above background.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Empire Creek

Dry streambeds: Yes ____, No X , Name(s): ________

Other surface water: Yes ____, No X , Name(s)/Description: ________

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1, -2, -3, and -4

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.3
High Flow: 2.5 , Average Flow: 0.25

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; stream runs over tailings.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Empire Creek flows through the tailings and breached dams.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agriculture, irrigation, fishery (Little Prickly Pear), wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 1000+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings present in sediment downstream.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Flammang, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient Empire Creek, 25' upstream from where creek crosses road	8.65	315	227	10.5	149	0.085 cfs (M)	25-175-SW-1	06/09/93 1641	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-1	SE	Upgradient Empire Creek, 25' upstream from where creek crosses road	N/A	N/A	N/A	N/A	N/A	N/A	25-175-SE-1	06/09/93 1641	T-Metals, CN-
SW-2	SW	At culvert below new dam	8.51	325	245	18.1	169	0.3 cfs (M)	25-175-SW-2	06/09/93 1545	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-2	SE	At culvert below new dam	N/A	N/A	N/A	N/A	N/A	N/A	25-175-SE-2	06/09/93 1545	T-Metals, CN-
SE-3	SE	500' below new dam	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-4	SE	1000' below new dam	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 15 acres covered by tailings now plus a possible 3 to 5 acres below last dam.

Wetlands present: Yes X , No ___, Describe: Wetlands present on either side of creek from tailings ponds down at least 1000 feet.

Carbonate rocks/soils: Yes X , No ___, Describe: Some associated with bed rock in area

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 160' upgradient; 250' upgradient recreational

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Babits, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	None	Partial	147,600	103,320	Yes	Low
TP-2	pH	Partial	--	--	Yes	Low
TP-3	pH	Partial	140,400	98,280	Yes	Low
TP-4	None	Partial	335,700	235,000	Yes	Low
Vat	None	Dry	15,210	15,210	Yes	Low

Notes and Clarifications: Area for TP-1 includes TP-2.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____
Describe: Possibly recreational; seasonal homes 160 and 250 feet upgradient

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments Part-time/recreational

Evidence of recreational use on site: Yes_X_, No___, Describe: Beer cans in mill building

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment
Wilderness Area - Yes___, No_X_, Comment
T&E Species Habitat - Yes_X_, No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No___, Comment

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _2_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:

Hazardous structures: Yes_X_, No___, Number_1_, types and locations: Mill building

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Possible due to oily sludge present in barrel.

Bibliography

MBMG, Form 39, Empire, Lewis and Clark County, Montana, 1967-1968.

MBMG, Mineral and Industry File 90.0, Empire Mine, Lewis and Clark County, Montana.

MBMG, State Technical Mine Visit Report for Empire Mine, Prepared by K.T. Bondurant, November 1, 1967.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Empire Mill, Prepared by Northern Engineering and Testing, June 30, 1988.

USGS, Topographic Map, Canyon Creek and Granite Butte, Montana, 7 1/2 minute Quadrangles, 1968.

LABORATORY ANALYTICAL DATA

EMPIRE MILLSITE
PA NO. 25-175

MDSL AMRB/PIONEER 4/9/93

Empire Mill PA# 25-175
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/09/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-175-SE-1	32 J	169	1.3 UJ	3.8	13.8	123	13400	0.443	192	5 J	425	9 UJ	501	1.88
25-175-SE-2	66 J	77.9	41.8	5.2	15.7	3350	18900	0.649	1690	15 J	7270	38 J	20000	0.87
25-175-TP-1	88 J	98.7	83.7	8.2	42.6	6660	26300	0.893	2380	27 J	13700	54 J	39300	0.18
25-175-TP-2	30 J	28.8	13.4	1.2	7.5	1840	9700	0.505	1660	11 J	7310	15 J	5020	0.87
25-175-TP-3	47 J	64.9	38.2	5.1	24.1	4160	18800	0.769	2340	17 J	10600	28 J	15600	0.99
BACKGROUND	38 J	239	0.5 UJ	8.2	14.1	49.7	19500	0.122	1000	15 J	80	4 J	153	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-175-TP-1	0.02	0.62	108	108	<0.01	<0.01	0.02	0	108
25-175-TP-2	<0.01	0	110	110	<0.01	<0.01	0.02	0	110
25-175-TP-3	0.05	1.56	141	139	<0.01	0.03	0.02	0.94	140

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-175-SW-1	5.62	46.4	3.2	5.99 U	5 U	1.35 U	20.6	0.14	2.6 U	8.78 U	2.2	18.3 U	6 U	173
25-175-SW-2	3.59	94.1	2.55 U	5.99 U	5 U	13.4	22.8	0.14	6.27	8.78 U	13.6	18.3 U	85.5	179

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-175-SW-1	195	< 5.0	20	0.27	0.01
25-175-SW-2	201	< 5.0	18	< 0.05	0.02

LEGEND

SE1 - Upgradient Empire Creek, 25' upstream from where creek crosses the road.
SE2 - At the culvert below new dam.
TP1 - Composite of subsamples TP2A and 3-2A.
TP2 - Composite of subsamples TP3-1C, 3-2B, and 3-2C.
TP3 - Composite of subsamples TP3-1D and 3-2D.
BACKGROUND - Same as Empire Mill (25-175-SS-1).

SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

EMPIRE MILLSITE
PA NO. 25-175

MDSL AMRB/PIONEER 4/9/93

Mine Name: Empire Millsite PA# 25-175
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-175-SE-3		10258.7	33816.9	341.937 *	194.001 *	1005.51 *	12964.6		1998.49	10295.9		117.948
25-175-SE-4		9777.65	28746.4	297.823 *		1419.78 *	13119.3		1633.54	8876.04		100.222
25-175-TP1-A		19215.1	51681.7	842.075		1990.33	26258.7		4610.53	22950.3		188.117
25-175-TP1-B		11008.6	40152.9	260.465 *		2415.21	14954.2		2970.15	15185.1		140.41
25-175-TP2-A		17080.1	32512.8	691.145		2942.95	27793.3		8368.55	38919.6		130.462
25-175-TP2-B		13971.7	34556.4	716.396		2122.79	20495.2		4566.89	20848.2		131.124
25-175-TP2-C		13345.9	61711.7	745.993		735.403 *	8657.87		796.345	2781.34		176.321
25-175-TP3-1A		14700.2	41343.9	429.717	118.576 *	1722.57	15790.9		3563.28	14960.5		135.596
25-175-TP3-1B		14580.5	49358.4	534.725	122.935 *	2067.08	16998.9		3330.24	13310.9		121.252
25-175-TP3-1C		10885.9	35985.9	337.887 *	119.038 *	1462.72	8288.22		529.063	1835.38		75.7338
25-175-TP3-1D		9072.53	30279.9	129.643 *		1347.95 *	8572.24		1290.23	3285.27		81.3189
25-175-TP3-2A		25480.9	17031.8	1427.61		2314.45	27834.7		3198.11	30214.8		63.1215
25-175-TP3-2B		20158.8	61068.4	714.803		1725.86	11699.5		652.155	2347.2		136.724
25-175-TP3-2C		20744.9	55798.6	591.912		2158.13	14087.3		851.564	3902.59		144.664
25-175-TP3-2D		13547.9	56848.4	215.59 *		2375.47	10130		1535.89	5010.02		131.926
25-175-TP-1-COMP		18248.3	34033.8	751.827		2041.76	23028.1		4687.5	29105.2		114.431
25-175-TP-2-COMP		17205	55580.1	588.553		1788.61	16782		2712.17	10274.4		131.251
25-175-TP-3-COMP		11684	43272	281.367 *		1537.42 *	8886.62	265.533 *	1285.07	3906.94		106.33
25-175-TP-4		15467.3	37766.8	619.731		1732.55	16613.6		3828.51	16249.4		102.5
25-175-VAT		11462	32461.1	243.349 *		1094.07 *	7629.25		873.95	3931.74		92.6042

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-175-SE-3	86.6816		7.61711 *	5663.43	94.1035			3635.3	124.949 *		
25-175-SE-4	80.5519			3410.76	92.1496			3102.54	66.624 *		
25-175-TP1-A	80.4639		23.9769 *	9008.42	147.422	163.705 *		690.672	193.813 *		37.3513 *
25-175-TP1-B	54.8132			2739.73	95.1659	109.115 *		398.099	121.857 *		
25-175-TP2-A	66.8357			11748.9	129.774	432.686 *		434.254	217.253 *		
25-175-TP2-B	76.5442			5683.92	108.83	201.917 *		397.653	200.867 *		
25-175-TP2-C	72.7128		13.8182 *	2239.88	98.9757			525.066	77.0718 *		
25-175-TP3-1A	52.4225		18.6244 *	7260.55	114.858	239.318 *		326.035	148.945 *		25.3493 *
25-175-TP3-1B	61.4308		6.47605 *	5242.6	98.8979			338.363	169.71 *		
25-175-TP3-1C	49.946			1520.98	85.7472			399.01	95.2606 *		
25-175-TP3-1D	27.5476		11.3144 *	4025.85	98.8694			214.894	111.121 *		
25-175-TP3-2A	147.504			13244.6	178.97	296.872 *		784.278	203.17 *		
25-175-TP3-2B	73.141		17.8813 *	1616.67	162.932	106.386 *		635.562	69.026 *		
25-175-TP3-2C	68.0083		13.0469 *	2555.58	163.306			525.841	96.429 *		
25-175-TP3-2D	34.089		20.6517 *	4405.21	115.883			203.117	124.295 *		
25-175-TP-1-COMP	76.38			9411.11	160.576	157.049 *		531.989	126.632 *		
25-175-TP-2-COMP	59.7581		13.4404 *	5377.87	153.654	161.583 *		487.409			
25-175-TP-3-COMP	26.2109		14.2732 *	3506.24	107.872			278.785	116.442 *		18.7831 *
25-175-TP-4	83.3885			3891.5	133.32	163.212 *	68.0097 *	466.504	91.5541 *		
25-175-VAT	43.1008			1905.42	99.1321			310.897	104.971 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

EMPIRE MILLSITE
PA NO. 25-175

AIMSS SCORESHEET

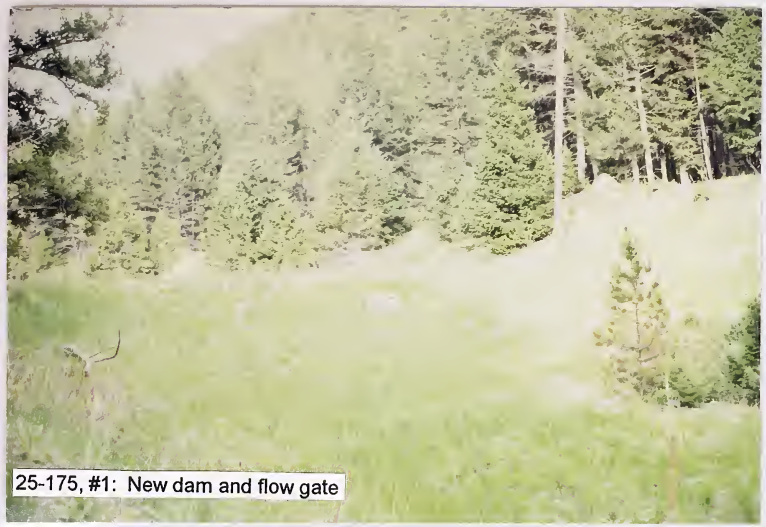
SITE NAME: EMPIRE MILLSITE
PA NUMBER: 25-175

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	156.714
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		315
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	325.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	20372820
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	173.410
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	28
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	3398836
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	15.367
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		10
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	138303
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		250
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	400
38		LIKELIHOOD SCORE	LINES 36 + 37C	650
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	13.884
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	13
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	117320
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**240.27**

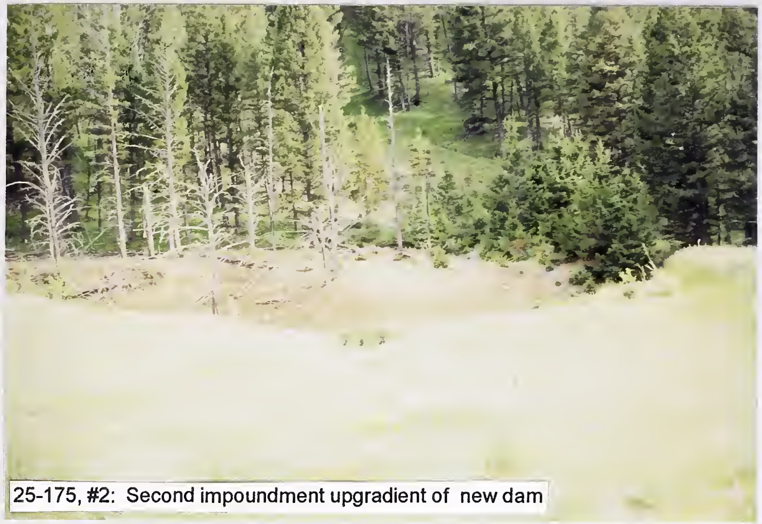
SITE NAME: EMPIRE MILLSITE
PA NUMBER: 25-175

SITE SAFETY

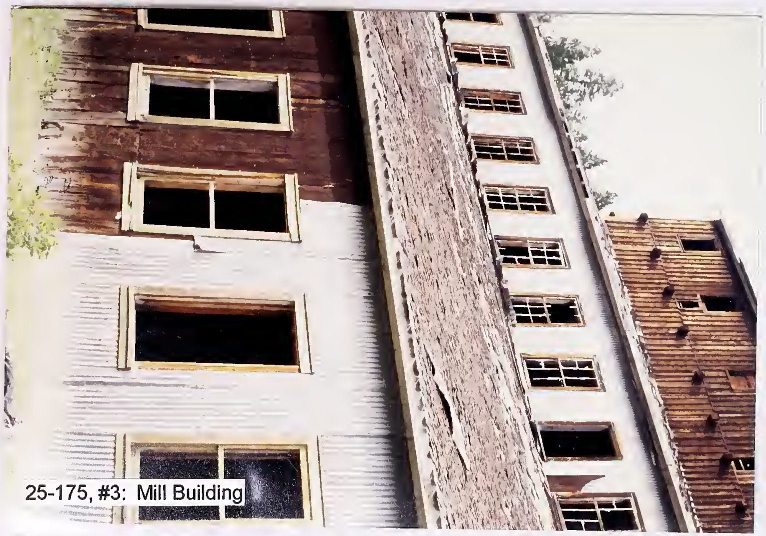
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	140
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	13
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**36.40**



25-175, #1: New dam and flow gate



25-175, #2: Second impoundment upgradient of new dam



25-175, #3: Mill Building

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BALD BUTTE MILLSITE **PA#:** 25-179

Date: August 18, 1993 **Time:** 0845

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy to clear; warm (65° to 70°F); slight to moderate breeze (5 to 10 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #20: Mill remains; #21: Dilapidated agitation device - large pond; #22: TP-1; #23: TP-2. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Large pond at the site is either underlain by tailings or has a lot eroded into it. Because of the high water, many of the small areas of dry tailings in the pond area could not be reached. Trout are in the pond and frogs are in the wetlands area that surrounds the pond.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Tailings should probably be removed as they sit in floodplain and contain elevated lead and mercury. Waste rock could be recontoured and revegetated.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BALD BUTTE MILLSITE **PA#:** 25-179

Legal Description: T 11N ;R 6W ;Sec. 16 , NW1/4 NE1/4 ___1/4

County: LEWIS AND CLARK **Mining District:** MARYSVILLE

Latitude: N 46° 42' 13" **Longitude:** W 112° 21' 24"

Primary Drainage Basin and Code: Dog Creek/17010201
Secondary Drainage Basin: Dago Gulch

USGS Quadrangle map name(s): Greenhorn Mountain

Mine Type/Commodities: Millsite/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner (Include address and phone when available): Cyprus Mineral Corp., 9100 East Mineral Circle, Engelwood, CO 80112; Helena National Forest.

Relationship to other mines/sites in the area/district: Numerous mines in the area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? No permit; possible revegetation.

General site features: Elevation 6400' , Slope Nearly level , Aspect Southeast

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 12 acres.
Dimensions: Approx. two-thirds of the area is wetlands and vegetation.

Predominant vegetation types: Lodgepole pine, willows, grasses

Access: roads - good X ,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Dog Creek flows north to south through the site; Dago Creek joins Dog Creek at the site. Metallic minerals from the mine were pyrite, galena, and sphalerite.

Mining/milling history, ore type/tenor, host rock, gangue: Concentrates carried 4 oz. of Au to 1 oz. of Ag and averaged roughly 10% Pb. Workings at the mine associated with diorite porphyry dike in hornstone. Ore minerals included molybdenite, free gold, pyrite, galena, and sphalerite. Mill was a 40-stamp mill.

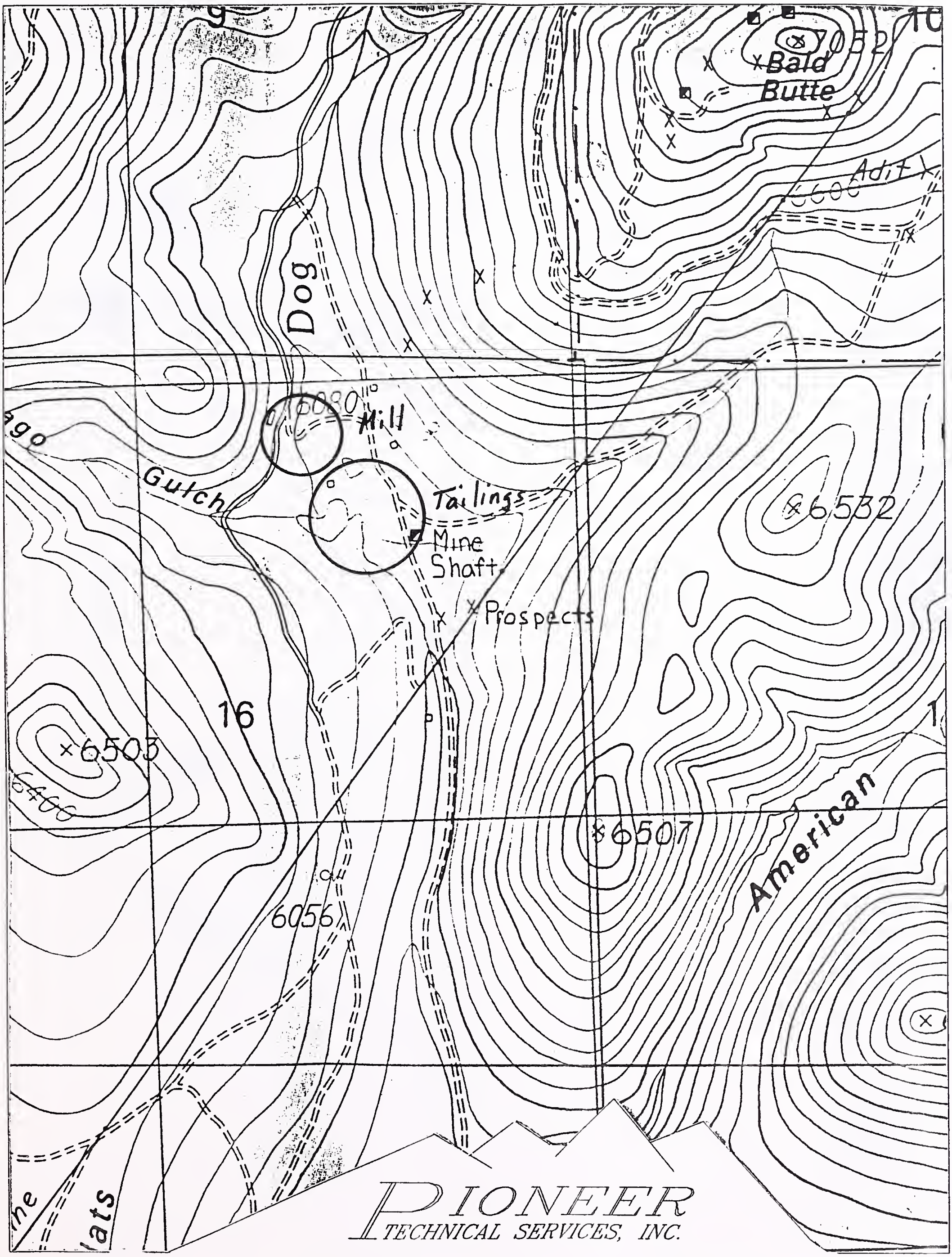
Mine Operation?
Shafts - Yes X , No ___, # 1 , Comment Fenced; at WR-1
Adits - Yes ___, No X , # ___, Comment
Pits - Yes ___, No X , # ___, Comment
Placers - Yes ___, No X , # ___, Comment
Other - Yes ___, No X , # ___, Comment

Mill Operation? Yes X , No ___. If yes answer the next three questions:

Period(s) of Operation: Mine operated continuously from 1890 to 1902; intermittently after 1902. Mill operation is unknown.

Origin of Ore Milled - Custom Mill ___ Dedicated Mill X ; Number and names of mines that supplied mill feed: Bald Butte Mine

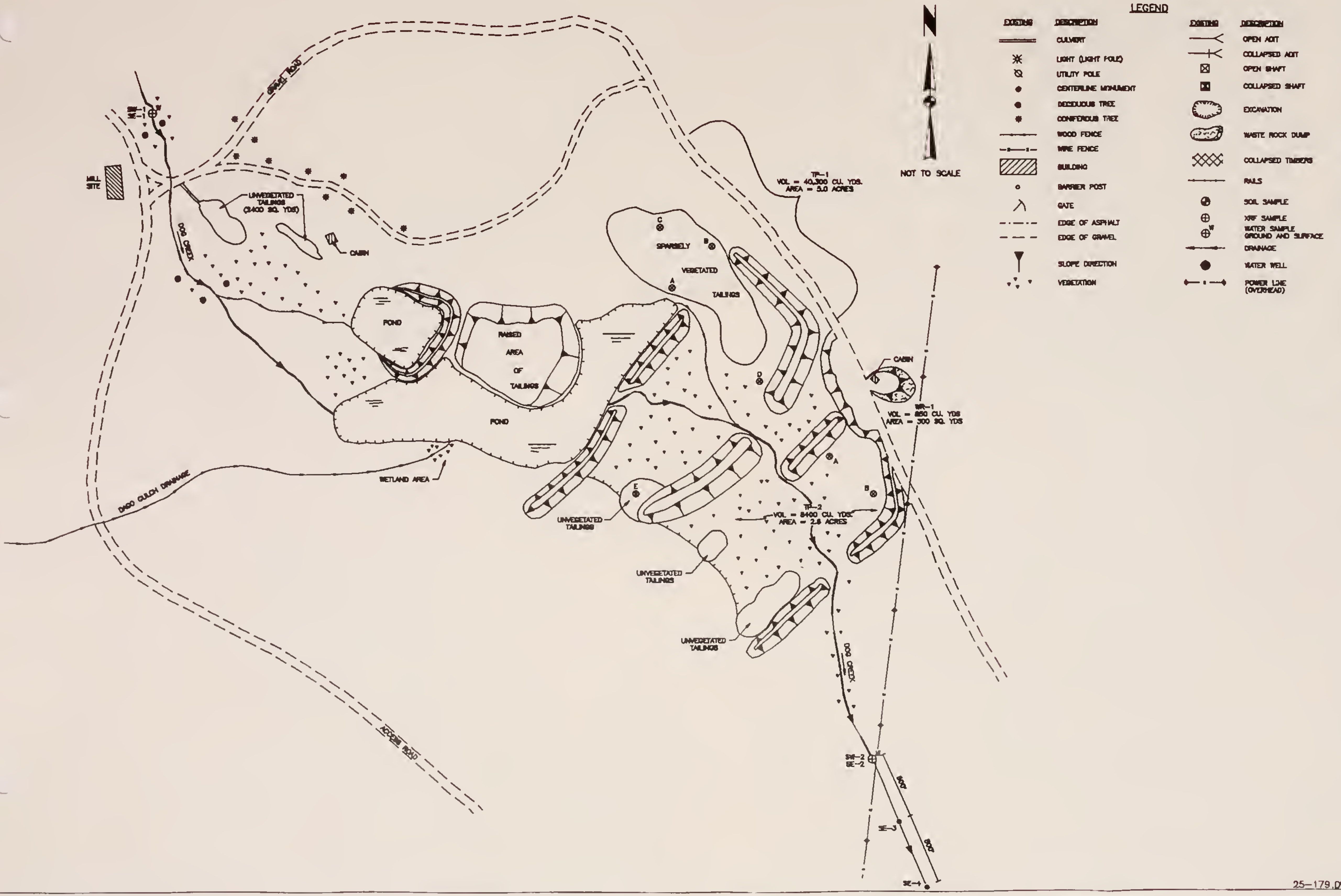
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
Hg-amalgam



PIONEER
TECHNICAL SERVICES, INC.

BALD BUTTE MILL, P.A. NO. 25-179

T11N, R06W, SECTION 16
SCALE: 1" = 1000'



25-179.DWG

SHEETS

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BALD BUTTE MILL SITE PA# 25-179
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

PIONEER

TDSH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

DRAWN MWC DATE 9/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 60% sand, 40% clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Because of high water levels, not all areas of ponds could be evaluated. Pond 1 appears to be 3' to 8' deep; pond 2 appears to be < 3' deep. In general, stratification is tan, lt. tan, or tan-yellow sand and clay approx. 0'-5', then gray or gray-tan sand or clay.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry to approx. 3', then damp or saturated (depending on closeness to standing water).

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Three dams are present and all are breached. The lowest dam has narrow, steep undercut banks on the southeast side.

Comments on potential for mitigation: Remove tailings due to lead and mercury levels.

SOURCE INVENTORY FORM

SAMPLERS: Babits, Flammang, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	40,300	Approx. 60' east of wood structure in the center of the pond; 0'-3.5'	Breached dam	6.5 (D)	0.04	25-179-TP-1	08/18/93 1810	T-Metals, ABA
TP-1B-A	TAIL		Approx. 80' west of east side of road, in between road and wood structure; 0'-5.5'	Breached dam	5.85 (D)	0.04			
TP-1B-B	TAIL		Approx. 80' west of east side of road, in between road and wood structure; 5.5'-6.5'	Breached dam	6.0 (D)	0.035	25-179-TP-2	08/18/93 1820	T-Metals, ABA
TP-1B-C	TAIL		Approx. 80' west of east side of road, in between road and wood structure; 6.5'-6.75'	Breached dam	6.4 (D)	0.045			
TP-1B-D	TAIL		Natural soil at 6.75'	Breached dam	NM	NM	25-179-TP-3	08/18/93 1825	T-Metals, ABA
TP-1D-C	TAIL		Just northwest of second breach; 4'-6'	Breached dam	< 3.5 (D)	0.04			
TP-1D-D	TAIL		Just northwest of second breach; 6-8'	Breached dam	< 3.5 (D)	0.05			
TP-2A-A	TAIL	8,400	0-1'	Breached dam	< 3.5 (D)	0.05	25-179-TP-4	08/18/93 1830	T-Metals, ABA
TP-2A-B	TAIL		1-2'	Breached dam	< 3.5 (D)	0.04			
TP-2B-A	TAIL		0-2'	Breached dam	< 3.5 (D)	0.04			
TP-2B-B	TAIL		Underlying soil	Breached dam	NM	NM			
WR-1	WR	850	North end of waste rock pile below shaft fence	None	5.1 (D)	0.05	25-179-WR-1	08/18/93 1400	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-179-TP-1 is composite of TP-1A-A, TP-1B-A, and TP-2A-B. 25-179-TP-2 is composite of TP-1B-B and -1B-C, and TP-1D-C and -1D-D. 25-179-TP-3 is composite of TP-1B-D and TP-2B-B. 25-179-TP-4 is composite of TP-2A-A and TP-2B-A.
NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:__________

Filled shafts: Yes___, No X , Number:____ Identification:__________

Seeps/Springs: Yes___, No X , Number:____ Identification:__________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 317

Distance to nearest well used for drinking? 2 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Uncontained source with elevated metal values; shallow water.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Dog Creek and Dago Gulch

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes X , No ___, Name(s)/Description: Two large ponds present on the north end of the site, also numerous wetland areas throughout the site.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1 and -2; tailings may also underlie the large ponds.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 20 gpm
High Flow: 200 gpm , Average Flow: 25 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____, Describe: Dago Gulch runs through TP-1 and -2. Wetland areas with standing water on tailings. Ponds may be underlain by tailings.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 500 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings are eroded by Dog Creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient on Dog Creek, 50′ from mill building	8.54	310	216	NM	136	20 gpm (E)	25-179-SW-1	08/18/93 1200	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
SE-1	SE	Upgradient on Dog Creek, 50′ from mill building	N/A	N/A	N/A	N/A	N/A	N/A	25-179-SE-1	08/18/93 1200	T-Metals
SW-2	SW	Downgradient on Dog Creek, 825′ from breach	7.56	273	212	NM	136	20 gpm (E)	25-179-SW-2	08/18/93 0945	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
SE-2	SE	Downgradient on Dog Creek, 825′ from breach	N/A	N/A	N/A	N/A	N/A	N/A	25-179-SE-2	08/18/93 0945	T-Metals
SE-3	SE	500′ downgradient on Dog Creek from SW-2	7.70	272	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-4	SE	1000′ downgradient on Dog Creek from SW-2	7.40	257	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 40 acres

Wetlands present: Yes X , No ___, Describe: The drainage of Dog Creek contains wetlands; approx. 6 acres of wetlands and ponds present on the site.

Carbonate rocks/soils: Yes X , No ___, Describe: Limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 ___; 30-100 X ; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Flammang, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	None	Partial	217,800	54,450	Yes	Moderate
TP-2	None	Partial	113,256	28,314	Yes	Moderate
WR-1	None	Dry	2,700	2,700	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe: Bike trails, camps, shotgun shells

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes___, No_X_, Comment____

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations: There is one shaft, but it is fenced.

Hazardous structures: Yes_X_, No___, Number_1_, types and locations: Mill building

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_1_, types and locations: Lowest tailings pond has steep, undercut banks with undercut trees collapsing off of it.

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Mill building and wood structure in center

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands Portal Inventory Form for Bald Butte, Prepared by Daphne Digrindakis, July 13, 1983.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Bald Butte Millsite, Prepared by Northern Engineering and Testing, June 28, 1988.

MDSL/AMRB Files, Statewide Archaeological Survey Form, Prepared by Pam Tennis, August 14, 1975.

USGS, Topographic Map, Greenhorn Mountain, Montana, 7 1/2 minute Quadrangle, 1989.

Western Mining World, Volume 14, No. 14, Eleventh Annual Report of the Bald Butte Mining Company, Written by B.H. Tatem, Secretary and Manager of Bald Butte Mining Company, April 6, 1901.

LABORATORY ANALYTICAL DATA

BALD BUTTE MILLSITE
PA NO. 25-179

Bald Butte Millsite PA# 25-179
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 08/18/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25–179–SE–1	209 J	281 J	34.6	10.4	15.8	928 J	24400 J	6.26 J	8950 J	15.1	3390 J	34.7	4240 J	NR
25–179–SE–2	407 J	209 J	14.7	7.39	10.5	431 J	23100 J	1.39 J	7760 J	7.94	1570 J	13.3	2100 J	NR
25–179–TP–1	216 J	88.7 J	15.5	3.37	10.4	538 J	15500 J	17.5 J	731 J	9.64	1370 J	7.16 U	2470 J	NR
25–179–TP–2	191 J	63.4 J	14.9	2.45	8.34	591 J	11200 J	14.4 J	409 J	7.6	1110 J	6.66 U	1940 J	NR
25–179–TP–3	193 J	117 J	18.8	6.94	13.3	684 J	18000 J	0.596 J	1050 J	11.9	612 J	6.61 U	2280 J	NR
25–179–TP–4	202 J	97.7 J	14.9	5.51	19.4	852 J	16300 J	15 J	1130 J	10.5	2500 J	12.3	2750 J	NR
25–179–WR–1	11800 J	21.7 J	410.0	7.58	10.9	1630 J	80900 J	0.282 J	1670 J	10.5	19800 J	72.7	73500 J	NR
BACKGROUND	51.1 J	290 J	1.9	5.21	8.25	82.4 J	7590 J	0.109 J	2390 J	4.81	139 J	10.2 U	190 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25–179–TP–1	0.04	1.25	17.3	16.1	<0.01	<0.01	0.05	0	17.3
25–179–TP–2	0.27	8.43	15	6.6	0.11	0.05	0.11	1.56	13.5
25–179–TP–3	0.07	2.19	8.43	6.24	0.03	0.01	0.03	0.31	8.12
25–179–TP–4	0.1	3.12	12.6	9.45	0.04	0.01	0.05	0.31	12.3
25–179–WR–1	7.12	222	183	–39.	<0.01	4.23	6.84	132	51.2

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25–179–SW–1	9.14	38	2.57 U	9.7 U	6.83 U	4.43 J	90.7	0.12 U	31.2	12.7 U	4.31 J	30.7 U	118 J	154
25–179–SW–2	24.3	34	2.57 U	9.7 U	6.83 U	6 J	283	0.12 U	102	12.7 U	7.08 J	30.7 U	71 J	134

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
25–179–SW–1	188	< 5.0	26	< 0.05	NR
25–179–SW–2	172	< 5.0	21	< 0.05	NR

LEGEND

SE1 – Upgradient on Dog Creek, 50 feet from mill building.
SE2 – Downgradient on Dog Creek, 825 feet from breach.
TP1 – Composite of subsamples TP1A–A, 1B–A, and 2A–B.
TP2 – Composite of subsamples TP1B–B, 1B–C, 1D–C, and 1D–D.
TP3 – Composite of subsamples TP1B–D, and 2B–B.
TP4 – Composite of subsamples TP2A–A and 2B–A.
WR1 – Sample of the WR1 subsample.
BACKGROUND – From the Wild Cat Mine (25–317–SS–1).

SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

BALD BUTTE MILLSITE
PA NO. 25-179

MDSL AMRB/PIONEER 4/9/93

Mine Name: Bald Butte Millsite PA# 25-179
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-179-SE-3		13608.7	7014.43	808.419		6911.36	19082		328.31	1753.7	485.647	60.7533
25-179-SE-4		24419.8	13084.4	1116.82		3165.52	12731.8		464.273	2303.63		74.3872
25-179-TP1A-A		19124.8	9736.13	459.467		730.696 *	10367.7		196.56	1290.25	91.1978 *	68.8836
25-179-TP1B-A		23353.3	11295.9	597.604		774.382 *	11088.1		256.436	1595.72		68.8656
25-179-TP1B-B		26093.9	20420.8	1085.14		1411.53	14665.8		426.101	1784.19		68.85
25-179-TP1B-C		17940.3	11601.2	739.649		667.214 *	13616.6		461.338	1410.76	164.396 *	55.6597
25-179-TP1B-D		20703.5	12656.1	913.558		571.901 *	14360.3		1151.63	1336.35	273.114	56.1476
25-179-TP1D-C		34673.5	18828.1	1326.22			10025.4		263.49	1546.66		81.8824
25-179-TP1D-D		25129	14849.7	659.845		342.945 *	6244.54		363.394	1781.2		64.9776
25-179-TP2A-A		31266.8	12776.7	1149.37		927.527 *	19657		995.289	2938.72		66.5491
25-179-TP2A-B		21008	12595.4	1917.97		1328.23	23167.6		169.51 *	1859.35	110.204 *	86.7242
25-179-TP2B-A		33914.4	15600.6	1146.6		290.704 *	17311.4		671.551	1091.16		91.9325
25-179-TP2B-B		15336.4	9634.67	2122.18		1294.46	24361.7		493.721	2099.96	156.729 *	96.5321
25-179-TP-1-COMP		25161	10331.7	653.157		449.107 *	10902.1		217.576	1457.07		71.5996
25-179-TP-2-COMP		23852.2	14106.8	967.363		580.235 *	11254.3		380.206	1774.85		72.0669
25-179-TP-3-COMP		12574	7812.98	1455.47	159.647 *	773.161 *	20699.2		425.568	1846.55	177.467	95.0213
25-179-TP-4-COMP		26253.6	11384.4	919.269		779.822 *	12788.2		546.036	1683.22		67.9194
25-179-WR-1		9026.15	47032	1821.24		2479.3	59249.3		814.36	21154.4	9154.23	82.1932

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-179-SE-3	108.729		37.9679	883.057	192.042			429.419	105.33 *		
25-179-SE-4	118.106		92.9409	1285.51	256.446	151.631 *		640.973			
25-179-TP1A-A	94.848		65.512	655.152	284.227			711.753	87.3823 *		
25-179-TP1B-A	91.8298		58.5219	832.194	302.318			799.765			
25-179-TP1B-B	121.024		69.4966	1141.7	298.738			886.095	110.551 *		
25-179-TP1B-C	118.929		50.3855	558.609	341.911			602.155	100.471 *		24.5282 *
25-179-TP1B-D	144.629		22.7506	417.944	408.991			460.261	124.196 *	45.1398 *	37.8089
25-179-TP1D-C	91.5987		194.436	1469.22	315.137	185.149 *		898.324			17.3475 *
25-179-TP1D-D	53.5621		246.737	1034.28	265.427			612.896			13.3003 *
25-179-TP2A-A	111.336		145.514	2068.24	379.805			753.853	132.446 *		16,0953 *
25-179-TP2A-B	234.862		6.28347 *	335.255	191.411			653.02	125.34 *		17.5862 *
25-179-TP2B-A	109.485		201.047	2022.06	372.054	131.863 *		786.537	113.893 *		13.6867 *
25-179-TP2B-B	230.605			354.264	294.43			474.142	92.8898 *		
25-179-TP-1-COMP	95.6933		50.1624	694.721	265.708	102.237 *		702.469			
25-179-TP-2-COMP	95.6672		134.734	1219.16	291.182	125.642 *		743.785	72.4574 *		24.4127 *
25-179-TP-3-COMP	181.265		12.6652 *	309.73	236.078			408.662	70.9816 *		
25-179-TP-4-COMP	82.9334		196.953	1289.62	312.574			606.784	79.6804 *		16.2149 *
25-179-WR-1	136.584			4908.48	105.176	397 *		138.327	185.638 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BALD BUTTE MILLSITE
PA NO. 25-179

AIMSS SCORESHEET

SITE NAME: BALD BUTTE MILLSITE
PA NUMBER: 25-179

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	43.062
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		317
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	317.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	5460262

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	47.332
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	596383

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.784
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1764

DIRECT CONTACT PATHWAY

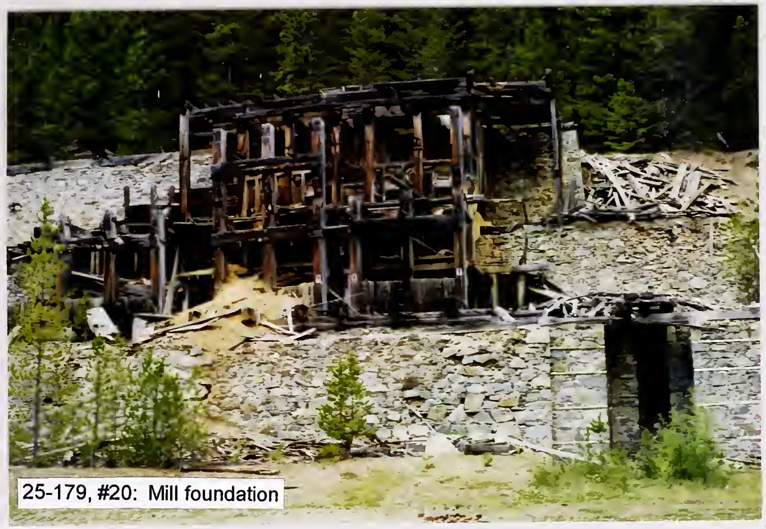
LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.719
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 THRU 42	10
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1079

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**60.59**

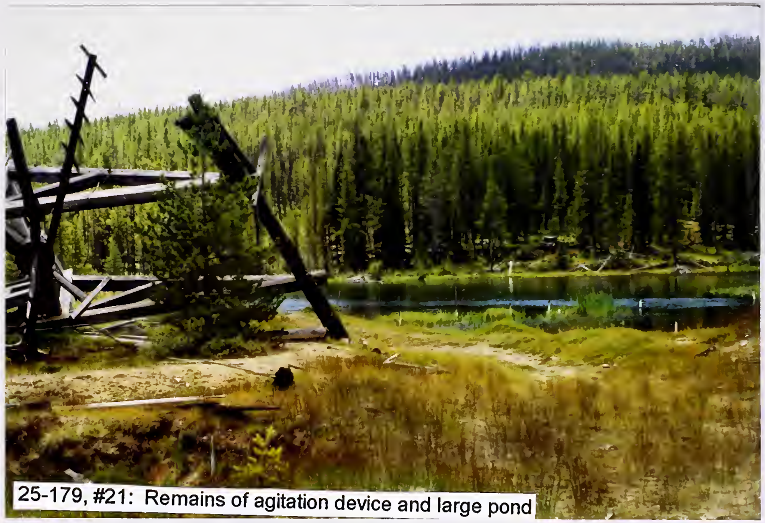
SITE NAME: BALD BUTTE MILLSITE
PA NUMBER: 25-179

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	40
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 THRU 11	10
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**8.00**



25-179, #20: Mill foundation



25-179, #21: Remains of agitation device and large pond

25-179, #22: TP-1

25-179, #23: TP-2

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: ARGO MILLSITE **PA#:** 25-314

Date: September 2, 1993 **Time:**

Field Team Leader: Bullock, Pioneer

Sampling Personnel: S. Babits, Pioneer

Visitors: Earl McCurley, MDSL/AMRB
John Koerth, MDSL/AMRB

Weather/Seasonality Observations: Cool to warm (50°F-70°F); partly cloudy to clear; calm.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17: Loadout; #18: Footings. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Argo tailings were sampled as part of the Goldsil Mill investigation (25-365).

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove hazardous structures.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): ARGO MILLSITE PA#: 25-314

Legal Description: T 12N ;R 5W ;Sec. 33 , SE1/4 SW1/4 ___1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 45' 02" Longitude: W 112° 14' 34"

Primary Drainage Basin and Code: Silver Creek/10030101
Secondary Drainage Basin: Silver Creek

USGS Quadrangle map name(s): Austin/Silver City

Mine Type/Commodities: Mill/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Dale Bergren, 643 South 212th Street, Elkhorn, NE 68022. (402) 289-4212.

Relationship to other mines/sites in the area/district: Related to the Goldsil Mill by investigation, tailings originating at Argo sampled during the Goldsil investigation.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4680', Slope 10°-20°, Aspect North

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions: Large tailings disturbance-Goldsil

Predominant vegetation types: Douglas fir, Lodgepole pine

Access: roads - good___,poor___,4wd___,trail X .
Other logistical considerations (proximity to other sites). Foot trail 100 feet up from the road on Goldsil tailings.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 6 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site sits on Silver Creek below Marysville. The Marysville district is situated on and around a small stock of quartz diorite intrusive into limestone and shales of the Belt series. This intrusive represents an outlier of the Boulder Batholith. The sedimentary rocks surrounding the quartz diorite have been thoroughly metamorphosed. These are made up mainly of various silicates, such as diopside, tremolite, and biotite.

Mining/milling history, ore type/tenor, host rock, gangue: No historical or operational accounts found for the Argo Mill.

Mine Operation?
Shafts - Yes___, No X , # ____, Comment____
Adits - Yes___, No X , # ____, Comment____
Pits - Yes___, No X , # ____, Comment____
Placers - Yes___, No X , # ____, Comment____
Other - Yes___, No X , # ____, Comment____

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: Unknown

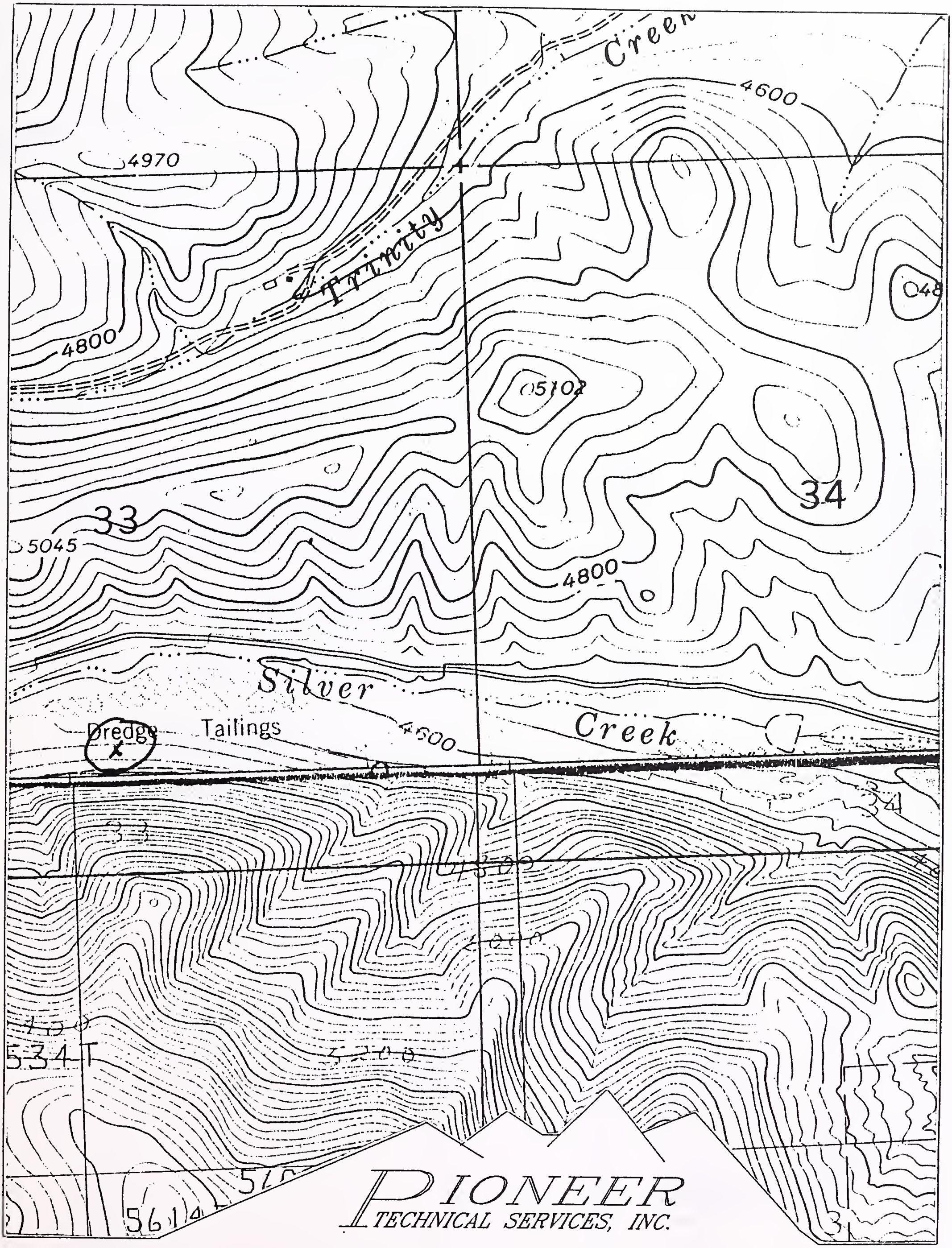
Origin of Ore Milled - Custom Mill X Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
Unknown

Montana Bureau of Mines and Geology
Water Well Log Data

11/05/1993

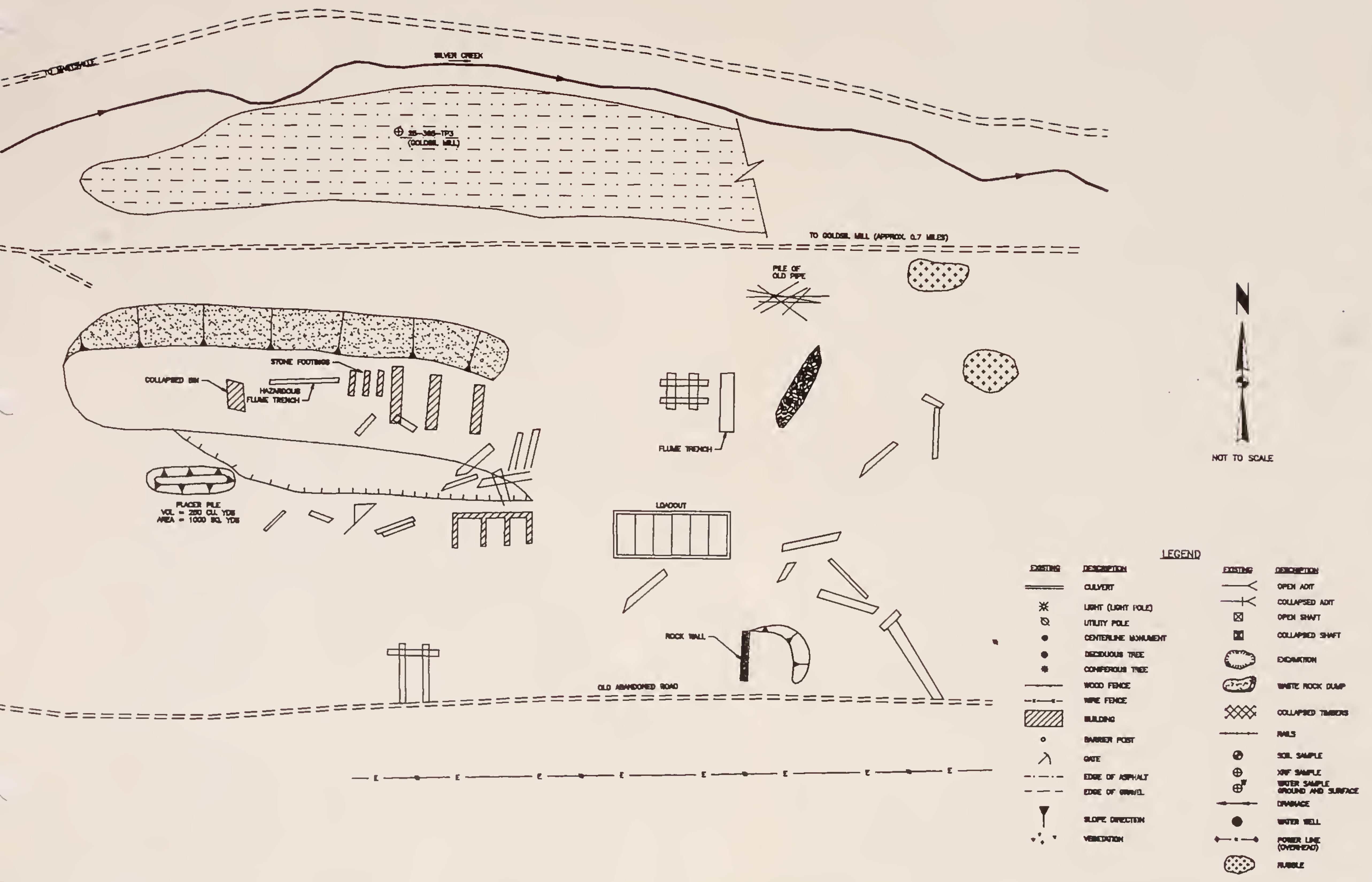
Well No.	Location	Depth	Yield	Static Water Level
M:66389	12N 05W 27 AA	147.0	15.0	85.00
M:66390	12N 05W 27 AC	200.0	15.0	25.00
M:66391	12N 05W 27 C	30.0	0.0	25.00
M:66393	12N 05W 33	76.0	45.0	2.00
M:66392	12N 05W 33	65.0	40.0	1.00
M:66394	12N 05W 33 DC	47.0	25.0	18.00



PIONEER
TECHNICAL SERVICES, INC.

ARGO MILL, P.A. NO. 25-314

T12N, R05W, SECTION 33
SCALE: 1" = 1000'



PIONEER

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

ARGO MILLSITE PA# 25-314
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-314.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Sand

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Tailings are 4 feet deep.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Impoundment is breached.

Comments on potential for mitigation: Requires additional investigation.

SOURCE INVENTORY FORM

SAMPLERS: S. Babits

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1C-A	TAIL	654,000	North of Argo structure; 0'-4', medium orange sand	Breached impoundment	NM	NM	25-365-TP-3	09/02/93 1700	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Sampled under the Goldsil investigation; volume is for all tailings west of the Goldsil Mill. NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 256

Distance to nearest well used for drinking? Approx. 2 miles to the nearest downgradient well

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
However tailings material does not seem to be in contact with alluvial aquifer. Tailings do contain slightly elevated metal values.

Other observations/notes: Potential groundwater contamination evaluated under Goldsil investigation.

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ____, Name(s): Silver Creek impacts evaluated under the Goldsil investigation.

Dry streambeds: Yes ____, No X, Name(s):

Other surface water: Yes ____, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No ___ Source ID(s): TP-1C is in historical flood plain of Silver Creek.

Approximate Flood frequency? ___1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 4 during investigation
High Flow: 50 cfs, Average Flow: 5 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes ____, No X,
Describe: Runoff only

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, wetland, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes _____, No X, Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed at the time of this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: M. Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-2	SW	At culvert on first road with gate when coming from Marysville, below some Goldsil tails and all Argo tails	8.34	337	160	12.0	187	4.0 cfs (M)	25-365-SW-2	09/02/93 1615	T-Metals, TDS, Hardness, Cl, SO3, NO2/NO3, CN-
SE-2	SE	At culvert on first road with gate when coming from Marysville, below some Goldsil tails and all Argo tails	N/A	N/A	N/A	N/A	N/A	N/A	25-365-SE-2	09/02/93 1615	T-Metals
SW-3	SW	200 feet upgradient of Argo Millsite in Silver Creek	8.14	335	126	10.3	185	2.0 cfs (M)	25-365-SW-3	09/02/93 1700	T-Metals, TDS, Hardness, Cl, SO3, NO2/NO3, CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Samples were collected during Goldsil Mill investigation.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? > 100 acres

Wetlands present: Yes X, No ___, Describe: Pond approx. 1/4 mile down from the lower drainage through Goldsil

Carbonate rocks/soils: Yes X, No ___, Describe: Limestone is reported in the Marysville district although none was observed on the site.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 0.6 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	None	Dry	671,000	436,000	Yes	Moderate

Notes and Clarifications: Area is for all tailings west of the Goldsil Mill.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_, Describe:______

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments______

Evidence of recreational use on site: Yes_X_, No_____, Describe: Motorbike tracks

Accessibility - Fences, warning signs, closed roads? Gates were locked; no trespassing signs were posted.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes___, No_X_, Comment______

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:______

Hazardous structures: Yes_X_, No___, Number_2_, types and locations: Mill foundation; loadout with 4 feet deep trenches located in the ground below

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Argo Millsite, Prepared by Northern Engineering and Testing, October 23, 1988.

USGS, Topographic Map, Austin and Silver City, Montana, 7 1/2 minute Quadrangles, 1985 and 1962.

LABORATORY ANALYTICAL DATA

ARGO MILLSITE
PA NO. 25-314

MDSL AMRB/PIONEER 4/9/93

Argo Millsite PA# 25-314
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-365-TP-3	13 J	58.6 J	1 U	3.48 J	6.54 J	53.1 JX	8480	5.42 JX	852	3.82 J	68.5	7.08 UJ	137 J	0.379 U
25-365-SE-2	34.2 J	94 J	1 U	1.39 J	3.85 J	23.2 JX	6400	3.11 JX	480	3.14 J	12.2	7.06 UJ	64.1 J	NR
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-365-TP-3	<0.01	0	49.9	49.9	<0.01	<0.01	<0.01	0	49.9

LEGEND

TP3 - Sample of TP1C-A subsample (Goldsil Millsite).
SE2 - At culvert on 1st road with gate coming from Marysville, below some Goldsil and Argo tailings.
BACKGROUND - From the Big Ox Mine (25-116-SS-1).
SW2 - Same as SE2.
SW3 - 200' upgradient of Argo mill site in Silver Creek.

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-365-SW-2	4.35	73.6	4.59 U	5 U	6.24 U	2.33 U	90.8	0.12 U	15.3	10.9 U	1.69	31.7 U	12.3	195
25-365-SW-3	2.56	68.4	4.59 U	5 U	6.24 U	2.33 U	93.3	0.12 U	16.9	10.9 U	1.53	31.7 U	12.4	181

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-365-SW-2	212	< 5	18	0.06	< 0.005
25-365-SW-3	189	< 5	18	0.09	< 0.005

XRF ANALYSIS RESULTS

ARGO MILLSITE
PA NO. 25-314

MDSL AMRB/PIONEER 4/9/93

Mine Name: Argo Millsite PA# 25-314
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-365-TP1C-A		21105.8	45663.8	904.582		1544.5	13599		239.809	593.531		132.292
25-116-SS-1		22233.2	12293.8	2424.98		1071.3 *	24321.4			166.821 *	46.0272 *	96.1912

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-365-TP1C-A	66.9399	46.3313 *		275.041	180.154			461.271			
25-116-SS-1	252.254				100.773			1137.91			11.4178 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

ARGO MILLSITE
PA NO. 25-314

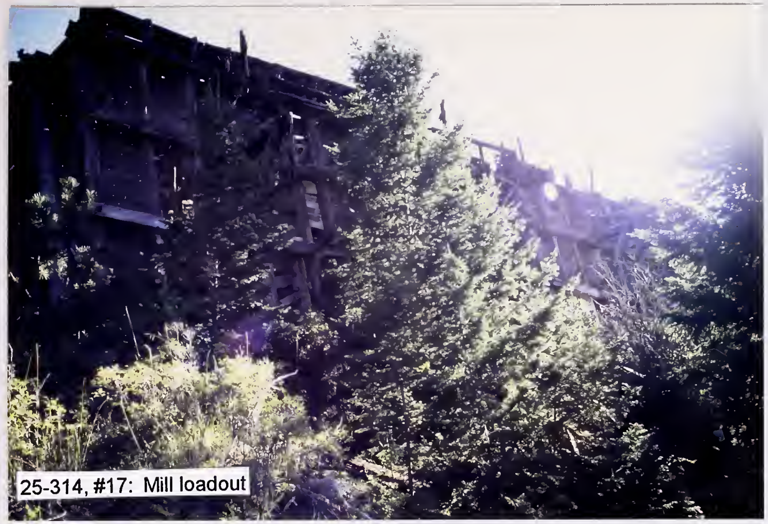
AIMSS SCORESHEET

SITE NAME: ARGO MILLSITE
PA NUMBER: 25-314

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
6	GW - TARGETS	WELLS - 1 MI. x 2.5		15.0
7		WELLS - 1 TO 4 MI		250
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	265.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	75
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			0.00

SITE NAME: ARGO MILLSITE
PA NUMBER: 25-314

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	80
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**2.40**



25-314, #17: Mill loadout

25-314, #18: Argo footings

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: WILD CAT PA#: 25-317

Date: August 18, 1993 Time: 1600

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; warm (65°F); slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: TP-1; #24: Wood tanks, steel tank and TP-1. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is reached by an old jeep trail up Lost Horse Creek off of Towsley Gulch; road was drivable during this investigation.

Other Hazardous Materials/Substances Present. N/A

General Comments on Potential Remedial Alternatives: Tailings are remote but contain Hg and some elevated metals, either remove or cap.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): WILD CAT PA#: 25-317

Legal Description: T 11N ;R 6W ;Sec. 4 , SW1/4 SW1/4 ___ 1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 43' 49" Longitude: W 112° 22' 00"

Primary Drainage Basin and Code: Little Prickly Pear/10030101
Secondary Drainage Basin: Lost Horse Creek

USGS Quadrangle map name(s): Greenhorn Mountain

Mine Type/Commodities: Millsite/Unknown

Activity Status: Active ___, Inactive/Exploration ___, Abandoned X .

Ownership status: Known YX N ___; private/public? Private
Owner, Agent, or Contact (Include address and phone when available): Jeffrey Warren, 8473 Green Meadow Drive, Helena, MT 59601. (406) 442-0279.

Relationship to other mines/sites in the area/district: Many mines in the area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6000' , Slope 13° , Aspect South

Land use: Mining ___, Recreational X , Residential ___, Urban ___, Agricultural ___, Other(Specify) ___

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions: ___

Predominant vegetation types: Pine, grasses, strawberry

Access: roads - good ___, poor ___, 4wd X , trail ___.
Other logistical considerations (proximity to other sites). ___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in drainage and on east side of intermittent Lost Horse Creek, which was dry during this investigation in the mine and tailings vicinity. Water leaving the site would flow north-northwest away from the site to confluence with Little Prickly Pear Creek five miles away.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes___, No_X_, # ____, Comment
Adits - Yes_X_, No___, # _1_, Comment Caved
Pits - Yes___, No_X_, # ____, Comment
Placers - Yes___, No_X_, # ____, Comment
Other - Yes_X_, No___, # ____, Comment Trench (500'x15'x5')

Mill Operation? Yes_X_, No___. If yes answer the next three questions:

Period(s) of Operation: Unknown

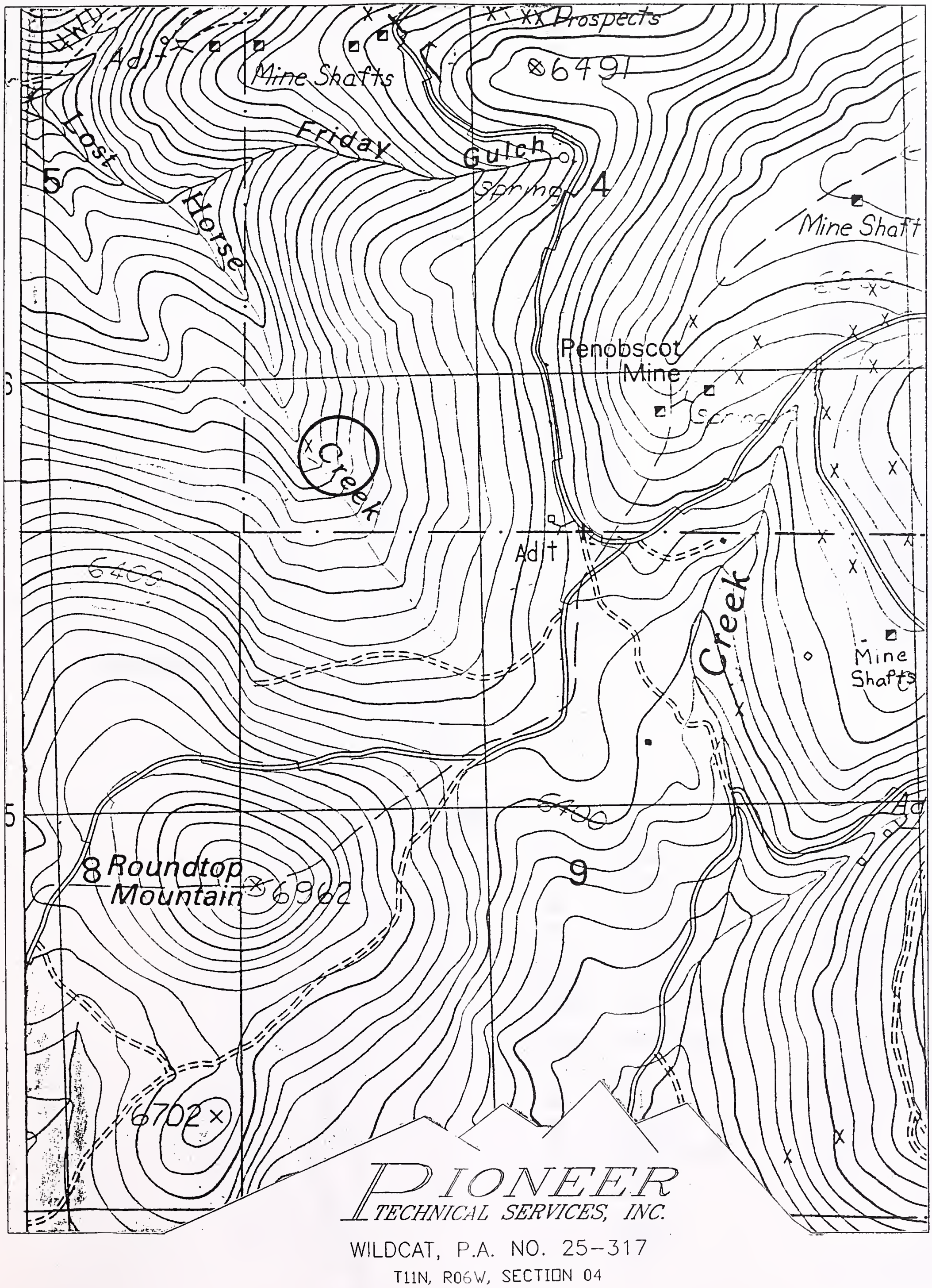
Origin of Ore Milled - Custom Mill___ Dedicated Mill_X_; Number and names of mines that supplied mill feed: Wild Cat

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? CN- leach appears to be vat (remnants of four wood vats are on the site).

Montana Bureau of Mines and Geology
Water Well Log Data

10/29/1993

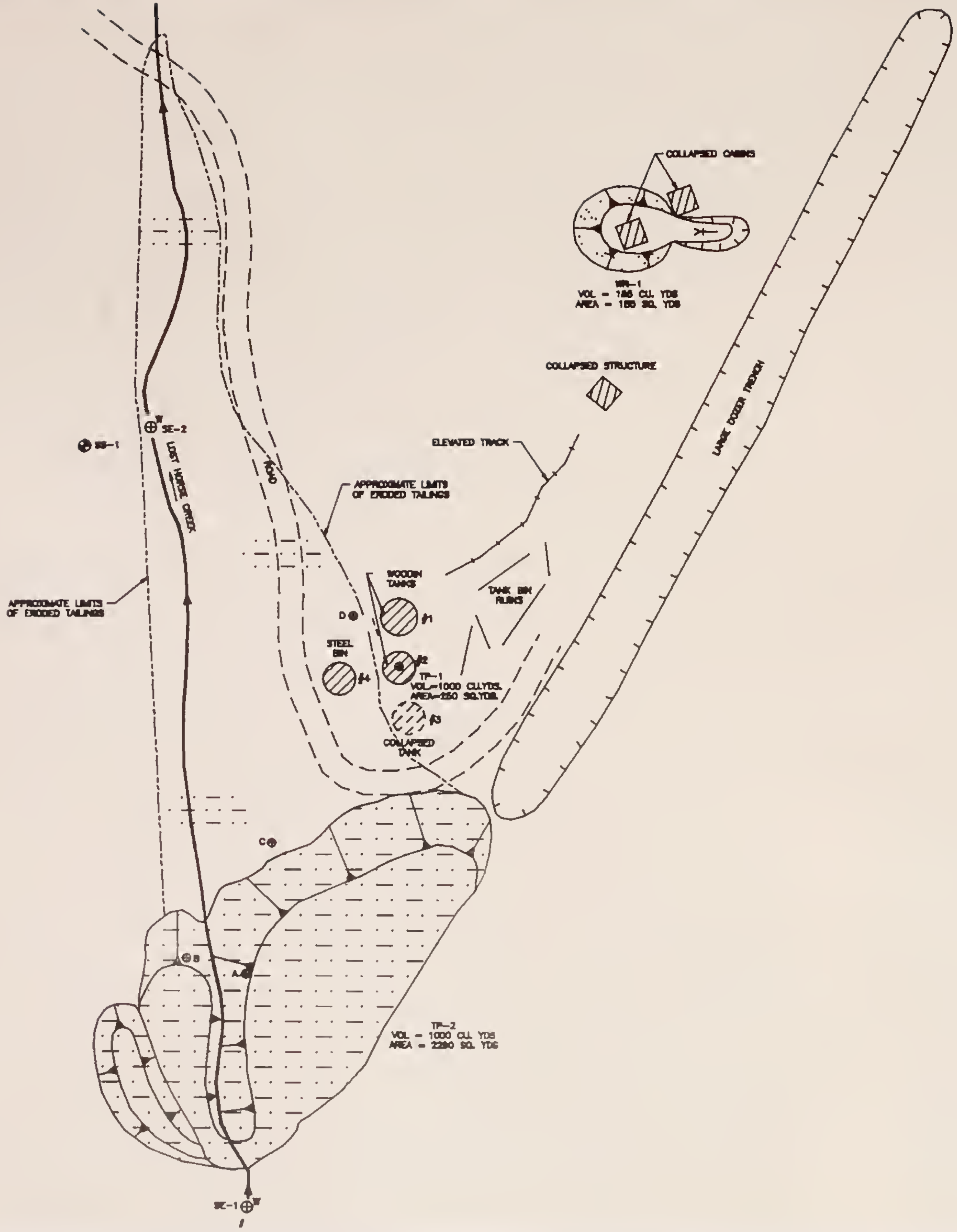
Well No.	Location	Depth	Yield	Static Water Level
[illegible]5947	12N 06W 32 ABD	6.0	0.0	530.00
M:66432	12N 06W 32 ACAB	303.0	28.0	5.00



PIONEER
TECHNICAL SERVICES, INC.

WILDCAT, P.A. NO. 25-317

T11N, R06W, SECTION 04
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION
═	CULVERT
☼	LIGHT (LIGHT POLE)
ø	UTILITY POLE
•	CENTERLINE MONUMENT
●	DECIDUOUS TREE
✱	CONIFEROUS TREE
—•—•—	WOOD FENCE
—x—x—	WIRE FENCE
▨	BUILDING
○	BARRIER POST
⋏	GATE
—·—·—	EDGE OF ASPHALT
— — —	EDGE OF GRAVEL
▼	SLOPE DIRECTION
⁖	VEGETATION
WR	WASTE ROCK
TP	TAILINGS PILE

EXISTING	DESCRIPTION
—<	OPEN ADIT
—+<	COLLAPSED ADIT
☒	OPEN SHAFT
■	COLLAPSED SHAFT
⬭	EXCAVATION
⬭	WASTE ROCK DUMP
⨯⨯⨯	COLLAPSED TIMBERS
——	RAILS
◕	SOIL SAMPLE
⊕	XRF SAMPLE
⊕W	WATER SAMPLE GROUND AND SURFACE
←—←—	DRAINAGE
●	WATER WELL
◆—•—◆	POWER LINE (OVERHEAD)
⁚—⁚—	TAILINGS

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

WILD CAT PA# 25-317
MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-317.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 100% fine sand and silt

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Deepest depth of tailings is 16 feet.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Tailings are in pile; no impoundments or barriers.

Comments on potential for mitigation: Recontour, cap, and seed

SOURCE INVENTORY FORM

SAMPLERS: Babits

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1	TAIL	1,000	No. 1 wood tank	Partial tank	6.2 (D)	0.03	25-317-TP-1	08/18/93 2000	T-Metals, ABA, CN-
TP-2A-A	TAIL	1,000	West lobe of TP-2 in gully, profile; 0-7'	None	6.6 (D)	0.03			
TP-2A-B	TAIL		West lobe of TP-2 in gully, profile; 7-8'	None	6.0 (D)	0.04	25-317-TP-2	08/18/93 2010	T-Metals, ABA, CN-
TP-2A-C	TAIL		West lobe of TP-2 in gully, profile; 8-14'	None	5.8 (D)	0.04			
TP-2B-A	TAIL		East lobe of TP-2 in gully, profile; 5-7'	None	6.6 (D)	0.04			
TP-2B-B	TAIL		East lobe of TP-2 in gully, profile; 7-8'	None	5.8 (D)	0.02			
WR-1	WR	185	Revegetated	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SS-1	BKGRND	N/A	Background soil west of creek	N/A	N/A	N/A	25-317-SS-1	08/18/93 1745	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-317-TP-1 is composite of TP-1, TP-2A-A and -2A-C, and TP-2B-A. 25-317-TP-2 is composite of TP-2A-B and TP-2B-B. WR-1 was completely revegetated.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:__________

Filled shafts: Yes___, No X , Number:____ Identification:__________

Seeps/Springs: Yes___, No X , Number:____ Identification:__________

Groundwater wells within 5 miles?: Yes X , No___;
Number of well logs: 312

Distance to nearest well used for drinking? 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Uncontained source, dry stream at base of tailings, metals values in tailings are elevated.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Lost Horse Creek

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): Tailings

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: < 1 cfs , Average Flow: 0

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, irrigation, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes X , No_____, Distance downstream (ft)? 385 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings are present on valley floor for approx. 400 feet from toe of tailings piles.

SURFACE WATER INVENTORY FORM

SAMPLERS: Lasher

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	Upgradient in Lost Horse Creek	N/A	N/A	N/A	N/A	N/A	N/A	25-317-SE-1	08/18/93 1700	T-Metals, CN-
SE-2	SE	Downgradient in Lost Horse Creek	N/A	N/A	N/A	N/A	N/A	N/A	25-317-SE-2	08/18/93 1645	T-Metals, CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 0

Wetlands present: Yes X , No ___, Describe: Limited to streamside

Carbonate rocks/soils: Yes ___, No X , Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments ___

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	None	Moist	2,250	2,250	Yes	Low
TP-2	None	Dry	20,610	20,610	Yes	Moderate/Low
WR-1	N/A	Dry	1,665	0	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X__,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None____

Evidence of recreational use on site: Yes___, No_X_, Describe:________
____

Accessibility - Fences, warning signs, closed roads?_Unrestricted___
____

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________________
Wilderness Area - Yes___, No_X_, Comment__________________
T&E Species Habitat - Yes_X_, No___, Comment_Peregrine Falcon____
Bat Habitat - Yes___, No_X_, Comment__________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _Not Rated_
Sport Fishery Classification - _Not Rated_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___
____
____

Hazardous structures: Yes_X_, No___, Number_2__, types and locations:_
Tanks____
____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:______________________________________
____
____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:__________________________
____
____

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_Tanks and cabin
____
____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Wild Cat, Prepared by Northern Engineering and Testing, October 23, 1988.

USGS, Topographic Map, Greenhorn Mountain, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

WILD CAT
PA NO. 25-317

Wild Cat PA# 25-317
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 08/31/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-317-SE-1	32.8 J	77.4 J	1.0	2.97	5.06	41.8 J	8640 J	0.398 J	664 J	6.59	117 J	9.28 U	191 J	0.518 U
25-317-SE-2	171 J	97.5 J	4.6	3.15	6.05	219 J	13300 J	0.916 J	2960 J	6.24	867 J	9.27	997 J	0.314 U
25-317-TP-1	455 J	92.5 J	14	4.7	7.99	813 J	16800 J	2.3 J	9120 J	2.89	2580 J	79.7	3190 J	0.278 U
25-317-TP-2	895 J	148 J	21	6.18	11.5	1080 J	26400 J	12.2 J	11500 J	3.99	3330 J	103	5310 J	0.348 U
BACKGROUND	51.1 J	290 J	1.9	5.21	8.25	82.4 J	7590 J	0.109 J	2390 J	4.81	139 J	10.2 U	190 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-317-TP-1	0.01	0.31	43.8	43.5	0.01	<0.01	<0.01	0	43.8
25-317-TP-2	0.01	0.31	50.1	49.8	0.01	<0.01	<0.01	0	50.1

LEGEND

SE1 – Upgradient in Lost Horse Creek.
SE2 – Downgradient in Lost Horse Creek.
TP1 – Composite of subsamples TP1, 2A-A, 2A-C, and 2B-A.
TP2 – Composite of subsamples TP2A-B and 2B-B.
BACKGROUND – West of creek. From Wild Cat Mine (25-317-SS-1).

XRF ANALYSIS RESULTS

WILD CAT
PA NO. 25-317

MDSL AMRB/PIONEER 4/9/93

Mine Name: Wildcat PA# 25−317
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25−317−SS−1		11282.2	8845.25	1500.89		3037.68	12242.8		73.8447 *	269.579	67.0738 *	98.6365
25−317−TP2A−A		24309.2	27441.4	780.194		7051.27	14637.4		365.6	1792.44		144.684
25−317−TP2A−B		28508.2	30633.4	1446.73		10272.4	25532		729.996	3780.65	426.085	125.627
25−317−TP2A−C		22632.1	19299.8	775.154		9364.56	16257		411.503	1855.57	174.121 *	132.841
25−317−TP2B−A		19028.6	13767.3	898.147		9228.74	15201.3		483.327	1924.77	120.302 *	122.063
25−317−TP2B−B		26079.2	18218.2	1210.47		16694.5	31388		1397.14	3510.54	1072.44	119.089
25−317−TP−1		21900.6	18999.9	821.881		8208.37	17890.3		504.114	1766.44	366.406 *	105.839
25−317−TP−1−COMP		18807.1	17337.6	678.324	133.873 *	7166.67	13319.8		364.626	1555.11	138.345 *	98.7254
25−317−TP−2−COMP		28797.5	24558.3	1479.11		12840.2	27366.5		990.21	3352.77	785.049	118.96

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25−317−SS−1	208.526			78.0885	72.6717			1818.39			
25−317−TP2A−A	113.748			1217.89	198.313		58.1962 *	942.857	95.5962 *		
25−317−TP2A−B	120.054			2193.77	228.604		347.426	905.821	111.983 *		
25−317−TP2A−C	104.802			1190.79	198.593		305.446	877.244	83.4911 *		
25−317−TP2B−A	105.701			1229.29	177.868		531.147	811.695	83.7781 *		
25−317−TP2B−B	78.0771		5.71161 *	3259.26	252.732		1353.21	546.703	159.533 *		
25−317−TP−1	80.6775			2001.25	208.904	152.297 *	215.732	790.901	77.7337 *		
25−317−TP−1−COMP	86.3274	67.9345 *		1118.26	157.09		342.46	644.908	65.9286 *		13.2934 *
25−317−TP−2−COMP	103.361	94.4389 *		2768.97	237.464		546.901	783.052			16.4119 *

* − Estimated Quantity
$ − Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

WILD CAT
PA NO. 25-317

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

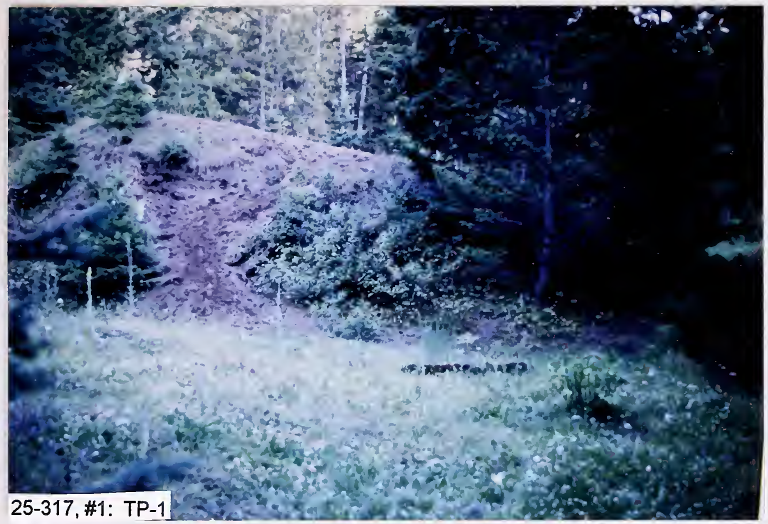
SITE NAME: WILD CAT
PA NUMBER: 25-317

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	4.182
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		310
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	315.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	52693
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	340
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	4.560
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	34109
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.320
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	840
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.293
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.88**

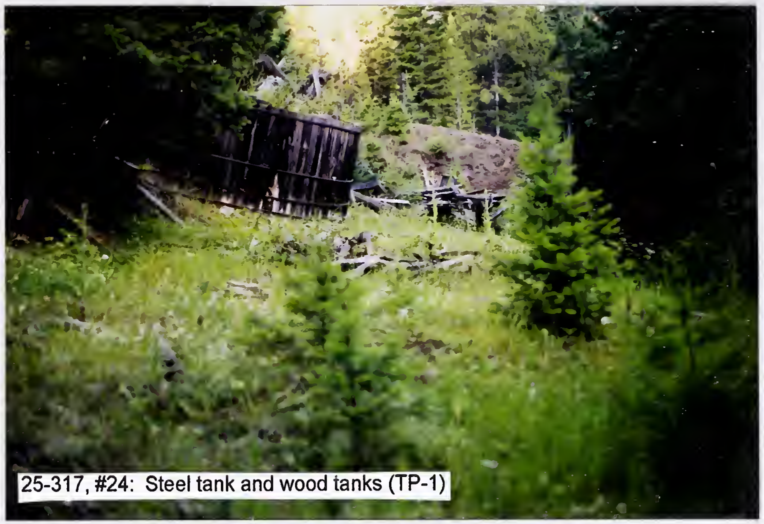
SITE NAME: WILD CAT
PA NUMBER: 25-317

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	80
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**



25-317, #1: TP-1



25-317, #24: Steel tank and wood tanks (TP-1)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: GOLDSIL MILLSITE **PA#:** 25-365

Date: September 2, 1993 **Time:** 0800

Field Team Leader: Bullock/M. Babits, Pioneer

Sampling Personnel: Flammang, S. Babits; Pioneer
Pierson; TD&H

Visitors: Earl McCurley, MDSL/AMRB
John Koerth, MDSL/AMRB

Weather/Seasonality Observations: Cool to warm (50°-70°), partly cloudy to clear, calm.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #10: SW-5; #11: TP-4; #12: TP-3; #13: Mill; #14: TP-2; #15: TP-1, East end; #16: TP-1, West end. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: Located in the mill building: Three 30 gal. barrels of HCl; 1 gal. hydrofluoric acid; 1 cyanide drum; four 100 lb. drums of lead acetate; 3 gal. methylketone; two 1-liter bottles of silver chloride; approx. 3 gal. of H2SO4; 5 gal. of ethylenediamine tretacetic acid; NaOH; and, 100 lb. bags of lime. A 30 gal. drum is located on the west side of TP-2 that is 1/2 full of an unknown liquid (no label) and the top of the drum is dented. On the south side of TP-2, there is a group of barrels which are silver galvanized. One is a 30 gal. drum which is open with powder in the bottom and labeled as "cyanide". It is possible that it is tailings.

General Comments on Potential Remedial Alternatives: Site requires additional study for preliminary recommendations.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): GOLDSIL MILLSITE PA#: 25-365

Legal Description: T 12N ;R 5W ;Sec. 33 ,SE 1/4SE 1/4 ___1/4

County: LEWIS AND CLARK Mining District: MARYSVILLE

Latitude: N 46° 45' 00" Longitude: W 112° 14' 12"

Primary Drainage Basin and Code: Canyon Creek/10030101
Secondary Drainage Basin: Silver Creek

USGS Quadrangle map name(s): Silver City

Mine Type/Commodities: Millsite/Gold

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Frank Duval, St. Louis Drum Lummon Mines, Inc., N 9 Post Street, Suite 241, Spokane, WA 99201.

Relationship to other mines/sites in the area/district: The Argo site is connected to the Goldsil and actually on Goldsil property.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? A 1988 CERCLA investigation indicated elevated levels of mercury and cyanide. The site is listed under CECRA

General site features: Elevation 4620', Slope 3°-5°,
Aspect Eastern and northern

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 55 acres.
Dimensions: 365 feet x 6,200 feet

Predominant vegetation types: Douglas fir, Lodgepole pine, sage brush

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Two locked gates block entry to site; must walk or obtain key.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site sits on Silver Creek below Marysville. The Marysville district is situated on and around a small stock of quartz diorite intrusive into limestone and shales of the Belt series. This intrusive mass represents an outlier of the Boulder Batholith. The sedimentary rocks surrounding the quartz diorite have been thoroughly metamorphosed. These are made up of mainly of various silicates such as diopside, wollastonite, tremolite, and biotite.

Mining/milling history, ore type/tenor, host rock, gangue: The mill was constructed in the mid-1970's for reprocessing tailings deposited along Silver Creek. Plant operation was shut down in 1976 due to cyanide releases into Silver Creek and reported fish kills. In 1979, the facility was reopened and shut down again in 1980 due to a fire and the cyanide releases. It has not operated since.

Mine Operation?
Shafts - Yes___, No_X_, # ____, Comment
Adits - Yes___, No_X_, # ____, Comment
Pits - Yes___, No_X_, # ____, Comment
Placers - Yes___, No_X_, # ____, Comment
Other - Yes___, No_X_, # ____, Comment

Mill Operation? Yes_X_, No___. If yes answer the next three questions:

Period(s) of Operation: Mid-1970's to October 1980

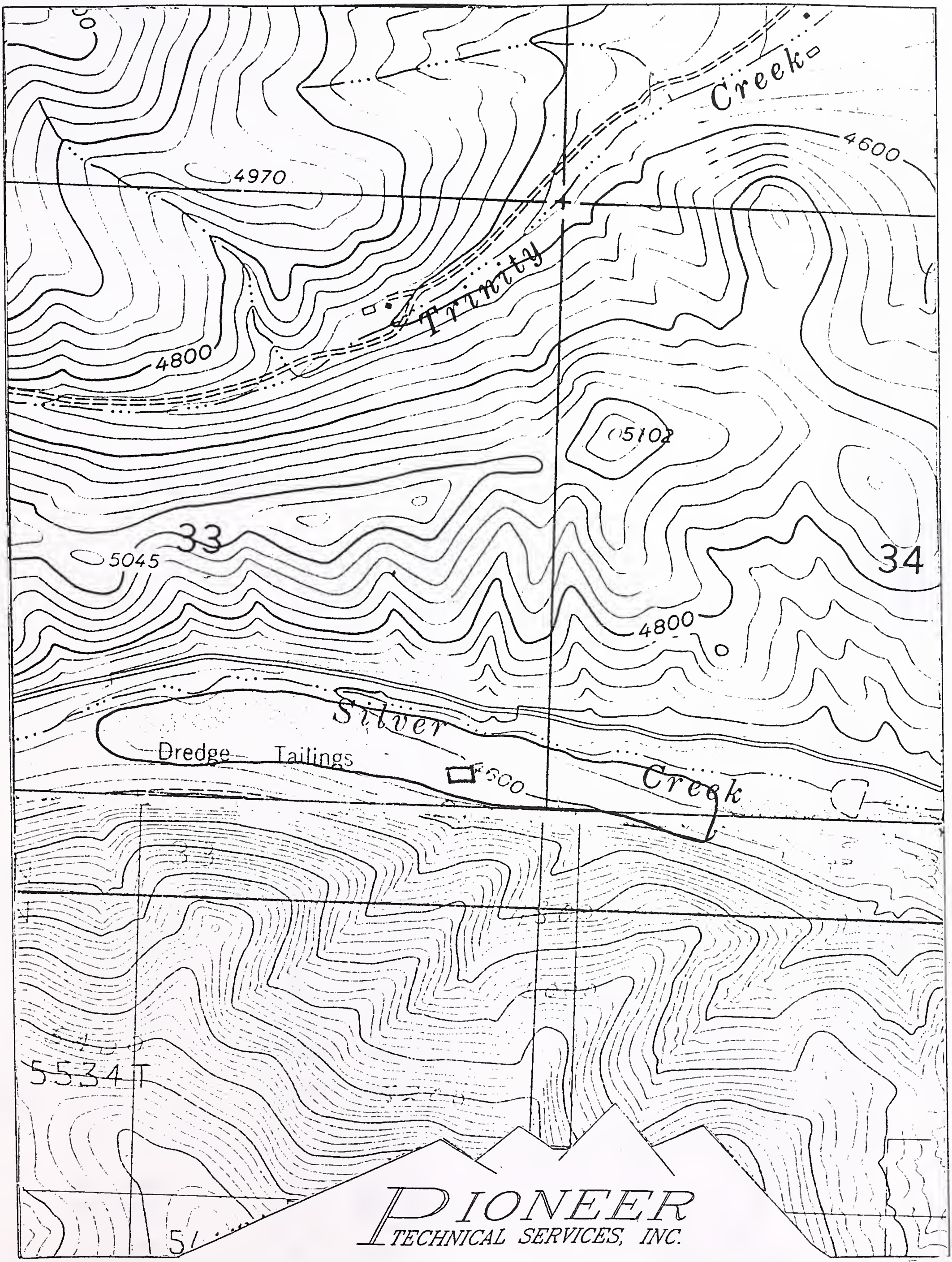
Origin of Ore Milled - Custom Mill_X_ Dedicated Mill___; Number and names of mines that supplied mill feed: Drumlummon Mine and reprocessing of tailings from the Argo Mill and the Drumlummon Mill.

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
CN- vat leach

Montana Bureau of Mines and Geology
Water Well Log Data

11/05/1993

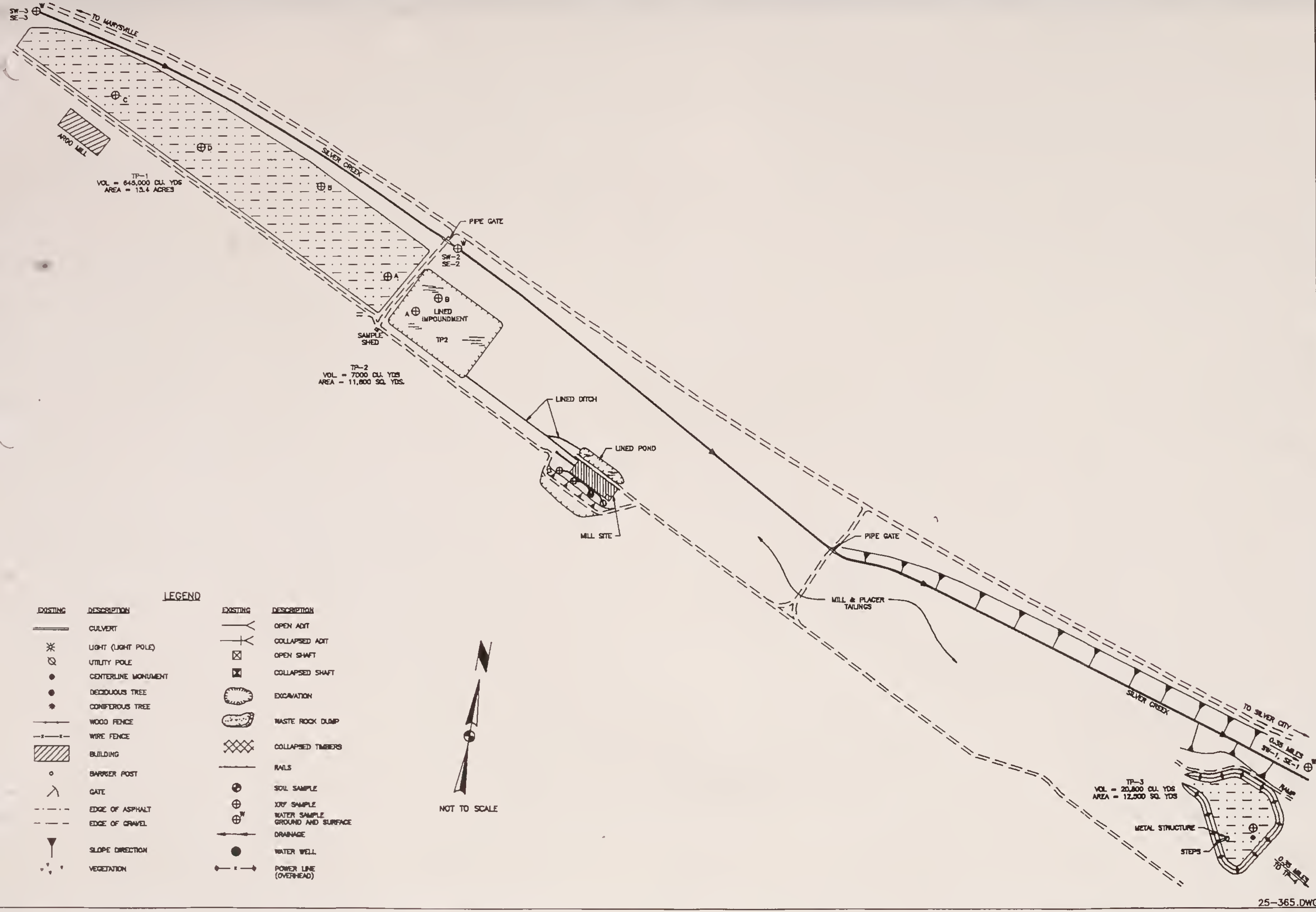
[illegible]ell No.	Location	Depth	Yield	Static Water Level	
M:66389	12N 05W 27 AA	147.0	15.0	85.00	
M:66390	12N 05W 27 AC	200.0	15.0	25.00	
M:66391	12N 05W 27 C	30.0	0.0	25.00	
M:66393	12N 05W 33	76.0	45.0	2.00	①
M:66392	12N 05W 33	65.0	40.0	1.00	②
M:66394	12N 05W 33 DC	47.0	25.0	18.00	③



PIONEER
TECHNICAL SERVICES, INC.

GOLDSIL MILLSITE, P.A. NO. 25-365

T12N, R05W, SECTION 33
SCALE: 1" = 1000'



25-365.DWG

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

GOLDSIL PA# 25-365

MARYSVILLE DISTRICT LEWIS AND CLARK COUNTY

SHEETS

SHEET NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Difficult to estimate percentages due to very large volume.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-1 tan sand reduced zone; TP-2 tan sand-no reduced zone; TP-3 is stratified with oxidized material from 0-4' and reduced materail from 4' to 6'.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): TP-1 dry at top, wet below 30'; TP-2 mostly wet; TP-3 moist; TP-4 mostly dry.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): TP-1 breached; TP-2 fair condition; TP-3 good condition; TP-4 good condition.

Comments on potential for mitigation: Requires additional investigation.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, M. Babits, S. Babits, Pierson*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	645,000	East end of old tailings, profile; 0-10', tan sand	Breached Impoundment	5.3 (D)	0.05	25-365-TP-1	09/02/93 1743	T-Metals, ABA, CN-
TP-1A-B	TAIL		East end of old tailings, profile; 10'-20', tan sand	Breached Impoundment	5.7 (D)	0.04			
TP-1A-C	TAIL		East end of old tailings, profile; 25'-29', tan sand	Breached Impoundment	5.3 (D)	0.04			
TP-1B-A	TAIL		200 yds west of TP-1A, profile; 0-7', tan sand	Breached Impoundment	5.6 (D)	0.03			
TP-1B-B	TAIL		200 yds west of TP-1A, profile; 7'-15', fine tan sand	Breached Impoundment	5.8 (D)	0.03			
TP-1B-C	TAIL		200 yds west of TP-1A, profile; 15'-25', fine tan sand	Breached Impoundment	5.6 (D)	0.03			
TP-1B-D	TAIL		200 yds west of TP-1A, profile; 25'-34', fine tan sand	Breached Impoundment	6.0 (D)	0.02			
TP-1B-E	TAIL		200 yds west of TP-1A, profile; 34'-37', brown sand/clay wet	Breached Impoundment	6.2 (D)	0.02			
TP-1C	TAIL		Argo Mill, borehole; 0-4', medium sand with gravel	Breached Impoundment	4.8 (D)	0.03	25-365-TP-3	09/02/93 1700	T-Metals, ABA, CN-
TP-1D-A	TAIL		600' west of mill, borehole; brown silt, 0-1'	Breached Impoundment	6.0 (D)	0.02	25-365-TP-2	09/02/93 1736	T-Metals, ABA, CN-
TP-1D-B	TAIL		600' west of mill, borehole; 1'-10', moist silt	Breached Impoundment	6.4 (D)	0.02			
TP-1D-C	TAIL		600' west of mill, borehole; 10-15', moist silt	Breached Impoundment	6.8 (D)	0.02			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-365-TP-1 is a composite of TP-1A-A through -1A-C, and TP-1B-A through -1B-E. 25-365-TP-2 is a composite of TP-1D-A through -1D-C. 25-365-TP-3 is a grab of TP-1C. *Continued on next page.

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: Bullock, M. Babits, S. Babits, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-2A-A	TAIL	7,000	Impound west of mill, borehole; 0-0.5', gray sand	Impoundment	6.6 (D)	0.04	25-365-TP-4	09/02/93 1710	T-Metals, ABA, CN-
TP-2A-B	TAIL		Impound west of mill; 0.5-4', tan fine sand	Impoundment	6.6 (D)	0.03			
TP-2A-C	TAIL		Impound west of mill; 4-5', tan wet fine sand	Impoundment	5.7 (D)	0.035			
TP-2B	TAIL		Near water, surface grab; 0-0.3', tan wet sand grab	Impoundment	6.2 (D)	0.03			
TP-3A-A	TAIL	20,800	Circular pond with decant tower; 0-4', brown clay - borehole	Impoundment	6.0 (D)	0.02	25-365-TP-5	09/02/93 1750	T-Metals, ABA, CN-
TP-3A-B	TAIL		Circular pond with decant tower; 4-6', blue/gray clay-moist	Impoundment	6.4 (D)	0.03			
TP-4A-A	TAIL	ND	Last pond southwest corner, borehole; 0-3', tan fine sand	Impoundment	4.8 (D)	0.04	25-365-TP-6	09/02/93 1748	T-Metals, ABA, CN-
TP-4A-B	TAIL		Last pond southwest corner; 3-4' wet silt	Impoundment	5.0 (D)	0.05			

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-365-TP-4 is a composite of TP-2A-A through -2A-C, and TP-2B. 25-365-TP-5 is a composite of TP-3A-A and -3A-B. 25-365-TP-6 is a composite of TP-4A-A and -4A-B. ND = Not Determined

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 312

Distance to nearest well used for drinking? Approximately 2 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Tailings material probably in contact with shallow alluvial aquifer.
Tailings contain elevated metals levels.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map o topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes__X_, No___, Name(s):__Silver Creek________________

Dry streambeds: Yes____, No_X_, Name(s):________________________

Other surface water: Yes__X_, No___, Name(s)/Description:__Standing water on TP-2.

Waste materials within any floodplain: Yes__X_, No___ Source ID(s):_ TP-1 in Silver Creek.

Approximate Flood frequency?_X_1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)?__6.0 cfs________________
High Flow:__50 cfs___, Average Flow:__5 cfs________

Distance between waste source(s) and nearest surface water body (ft)?_ 0 feet

Surface water draining onto or through waste sources: Yes__X_, No____,
Describe:__Historic seepage from TP-4 has been reported. The pond is now dry with no evidence of seeps.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, wetland, stock water

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_____, Distance downstream (ft)?________ Describe/explain(Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________
None documented.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang, Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	At toe of Berm with flow gate in Silver Creek	8.89	346	168	12.0	207	6.0 cfs (M)	25-365-SW-1	09/02/93 1520	T-Metals, TDS, Cl, Hardness, SO4, CN, NO2/NO3
SE-1	SE	At toe of Berm with flow gate in Silver Creek	N/A	N/A	N/A	N/A	N/A	N/A	25-365-SE-1	09/02/93 1520	T-Metals
SW-2	SW	At culvert (downgradient) at road with gate (farthest up) in Silver Creek	8.34	337	160	12.0	187	4.0 cfs (E)	25-365-SW-2	09/02/93 1615	T-Metals, TDS, Cl, Hardness, SO4, CN, NO2/NO3
SE-2	SE	At culvert (downgradient) at road with gate (farthest up) in Silver Creek	N/A	N/A	N/A	N/A	N/A	N/A	25-365-SE-2	09/02/93 1615	T-Metals
SW-3	SW	Up (200') from mill building (Argo) in Silver Creek	8.14	335	126	10.3	185	2.0 cfs (M)	25-365-SW-3	09/02/93 1700	T-Metals, TDS, Cl, Hardness, SO4, CN, NO2/NO3
SW-5	SW	Pregnant pond below mill	8.79	190	NC	NC	76	0	25-365-SW-5	09/02/93 1630	CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? >100 acres

Wetlands present: Yes X , No___, Describe: Pond approximately 1/4 mil down from the lower drainage.

Carbonate rocks/soils: Yes X , No___, Describe: Limestone is reported within the Marysville district although none was observed directly on the site.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 0.8 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, S. Babits, M. Babits, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	pH	Dry	671,000	436,000	Yes	Moderate
TP-2	None	Partial	106,200	106,200	Yes	Low
TP-3	None	Partial	112,500	22,500	No	None
TP-4	pH	Dry	ND	ND	Yes	Low

Notes and Clarifications: ND = Not Determined

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Motor bike tracks on the tailings.

Accessibility - Fences, warning signs, closed roads? Two locked gates restrict access.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes_X_, No___, Number_1_, types and locations: Mill complex

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number____, types and locations: Portions of TP1 are undercut by Silver Creek.

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Mill structure with hazardous materials inside.

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDHES, Site History Report, Goldsil Mining Company, Marysville, Montana.

MDHES, Site Investigation Report for Goldsil Ranchers Company, Roy F. Weston Work Order No. 3264-02-01, July 8, 1988.

MDHES/SHWB, Superfund Basics, Overview and Accomplishments of Superfund in Montana 1983-1993, November 1993.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Goldsil Millsite, Author Unknown, Date Unknown.

USGS, Topographic Map, Silver City, Montana, 7 1/2 minute Quadrangle, 1962.

LABORATORY ANALYTICAL DATA

GOLDSIL MILLSITE
PA NO. 25-365

MDSL AMRB/PIONEER 4/9/93

Goldsil Millsite PA# 25–365
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 09/02/93

SOLID MATRIX ANALYSES

Metals in soils   Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25–365–SE–1	66.6 J	83.3 J	1.0 U	4.26 J	5.27 J	31.8 JX	11400	0.69 JX	787	6.22 J	16.2	7 UJ	62.4 J	NR
25–365–SE–2	34.2 J	94 J	1.0 U	1.39 J	3.85 J	23.2 JX	6400	3.11 JX	480	3.14 J	12.2	7.06 UJ	64.1 J	NR
25–365–TP–1	41.2 J	51.7 J	2.0	2.35 J	6.07 J	197 JX	8470	81.4 JX	884	3.4 J	237	10.8 J	470 J	2.57
25–365–TP–2	37.1 J	52.5 J	2.0	1.97 J	4.92 J	187 JX	7620	46.4 JX	843	3.43 J	207	11.1 J	400 J	2.4
25–365–TP–3	13 J	58.6 J	1.0 U	3.48 J	6.54 J	53.1 JX	8480	5.42 JX	852	3.82 J	68.5	7.08 UJ	137 J	0.379 U
25–365–TP–4	34.9 J	74.8 J	2.0	4.9	18.6	198	11700 J	21.4 J	827	13 J	245 J	31.2 J	477 J	3.13
25–365–TP–5	84.5 J	117 J	3.5	5.96	15.3	379	18600 J	223 J	1430	14 J	537 J	66.9 J	1010 J	1.97
25–365–TP–6	36.6 J	59.9 J	3.4	4.35	7.86	160	9210 J	86 J	857	8.39 J	205 J	30.3 J	412 J	2.82
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25–365–TP–1	0.03	0.94	84.1	83.1	0.01	<0.01	0.02	0	84.1
25–365–TP–2	<0.01	0	68.5	68.5	<0.01	0.02	0.02	0.62	67.8
25–365–TP–3	<0.01	0	49.9	49.9	<0.01	<0.01	<0.01	0	49.9
25–365–TP–4	<0.01	0	78.5	78.5	<0.01	<0.01	0.02	0	78.5
25–365–TP–5	0.05	1.56	124	122	0.01	0.01	0.03	0.31	123
25–365–TP–6	0.22	6.87	82.9	76.1	0.09	0.03	0.1	0.94	82

WATER MATRIX ANALYSES

Metals in Water   Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25–365–SW–1	5.29	82.7	4.59 U	5 U	6.24 U	2.33 U	123	0.12 U	21.8	10.9 U	1.13	31.7 U	8.71 U	212
25–365–SW–2	4.35	73.6	4.59 U	5 U	6.24 U	2.33 U	90.8	0.12 U	15.3	10.9 U	1.69	31.7 U	12.3	195
25–365–SW–3	2.56	68.4	4.59 U	5 U	6.24 U	2.33 U	93.3	0.12 U	16.9	10.9 U	1.53	31.7 U	12.4	181

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry   Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
25–365–SW–1	213	< 5	19	< 0.05	< 0.005
25–365–SW–2	212	< 5	18	0.06	< 0.005
25–365–SW–3	189	< 5	18	0.09	< 0.005
25–365–SW–5	NR	NR	NR	NR	< 0.005

LEGEND

SE1 – At toe of berm with flow gate in Silver Creek.
SE2 – At culvert (downgradient) at road.
TP1 – Composite of subsamples TP1A–A through 1A–C and 1B–A through 1B–E.
TP2 – Composite TP1D–A, B, and C.
TP3 – Sample of the TP1C subsample (Argo Mill Tailings).
TP4 – Composite of subsamples TP2A–A, B, C, and 2B.
TP5 – Composite of subsamples TP3A–A and 3A–B.
TP6 – Composite of subsamples TP4A–A and 4A–B.

BACKGROUND – From the Big Ox Mine (25–116–SS–1).
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.
SW3 – Upgradient (200') from mill building (Argo) in Silver Creek.
SW5 – Pregnant pond below mill.

XRF ANALYSIS RESULTS

GOLDSIL MILLSITE
PA NO. 25-365

Mine Name: Goldsil Millsite PA# 25−365
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25−365−TP1A−A		17609.7	36118.8	764.435	205.253 *	1448.5	11171.5		282.599	581.303		129.65
25−365−TP1A−A−C		17612.3	35502	808.343		1146.9 *	11657.7		213.608 *	550.791	63.3962 *	126.936
25−365−TP1A−B		18921.5	34566.9	747.755	245.932 *	830.426 *	10953.5		205.594	437.895		120.412
25−365−TP1A−B−C		19545.2	34764	688.147		1130.98	11385.7		143.767 *	480.92	53.9601 *	124.593
25−365−TP1A−C		13688.3	32106.6	607.875	260.604 *	878.859 *	8752.95		163.049	375.395		112.557
25−365−TP1A−C−C		15571.3	34898.3	744.006		879.373	9251.01		165.264	404.755	36.0638 *	123.585
25−365−TP1A−C−C−DUP		15447.2	34983.5	691.34		712.998 *	9151.85		132.632 *	420.428	52.7621 *	117.265
25−365−TP1A−C−DUP		14157.3	32766.8	605.28	326.366 *	933.02 *	9277.6		220.675	404.52		125.953
25−365−TP1B−A		20088.3	40557	764.968	280.742 *	1082.77	11518.2		231.761	533.225		132.377
25−365−TP1B−B		16886.4	32346.7	566.641		1000.33	9220.08		90.3718 *	346.137	35.1758 *	121.765
25−365−TP1B−C		15243.5	22222.1	374.03 *	200.319 *	656.018 *	6494.88		168.403	298.537		92.5838
25−365−TP1B−D		13712.5	23832.8	329.379 *		602.59 *	7212.91		48.146 *	279.3	46.2883 *	102.19
25−365−TP1B−E		16727.6	43933.7	796.282		1206.04	9242.71		221.796	557.015		128.351
25−365−TP1C−A		21105.8	45663.8	904.582		1544.5	13599		239.809	593.531		132.292
25−365−TP1D−A		9814.26	17394.7	239.706 *	184.932 *	430.676 *	5456.33		98.6118 *	230.154		104.1
25−365−TP1D−B		13086.5	24574.8	416.043 *	229.474 *	886.287 *	7027.84		174.781	295.095		91.7869
25−365−TP1D−C		14376.8	26308.6	424.884 *	140.415 *	896.805 *	8523.88		172.063	315.434		114.446
25−365−TP1D−C−C		14399.6	27806.8	535.813		930.484	8526.24		92.9879 *	320.116	36.8433 *	113.515
25−365−TP2A−A		12247.6	21372.4	294.206 *		450.255 *	6565.55			140.35	48.3179 *	115.017
25−365−TP2A−B		12058.7	22536.5	399.785 *		792.177 *	6609.46			197.616		112.834
25−365−TP2A−C		17879.3	32692.9	591.215		1031.62	9528.62		156.196 *	397.153		114.925
25−365−TP2B−C		15514	29170.8	635.867	229.352 *	873.685 *	11723.2		157.139 *	263.664		135.702
25−365−TP2−B		16251.6	29350.3	672.352		689.688 *	12135.2		90.4054 *	316.842	65.3661 *	133.35
25−365−TP3A−A		21080.6	43061.4	943.272		1528.01	17816.4		316.542	877.996	118.97 *	135.366
25−365−TP3A−B		23763.3	46806.7	976.547		1518.34	18155		308.763	766.421	51.3069 *	143.879
25−365−TP4A−A		15766.3	27174.7	430.158 *		689.464 *	6277.89		42.3658 *	257.026	30.4523 *	112.793
25−365−TP4A−B		18336.8	34965.9	754.369		1129.08	11573.3		150.78 *	416.316		128.644
25−365−TP−1−COMP		17472	34090.9	699.57		960.149	9883.58		133.761 *	389.845		124.642
25−365−TP−2−COMP		17696.8	31821.2	565.781	236.274 *	896.395 *	8964.96		207.59	346.407		115.779
25−365−TP−4−COMP		16501.6	30598.5	501.453 *		901.185	9045.76		49.2543 *	252.098	42.3293 *	128.453
25−365−TP−5−COMP		22355.1	44794	906.412		1547.23	17514.4		289.038	834.589		129.328
25−365−TP−6−COMP		17519.9	30777.8	485.322 *		890.029	8397.76		117.818 *	337.205		121.84

Mine Name: Goldsil Millsite PA# 25-365
XRF Field Analyses
Results in PPM
Page 2 of 2.

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-365-TP1A-A	67.8121	41.5531 *		280.132	164.448		87.1111 *	387.136			
25-365-TP1A-A-C	65.2713	63.7697 *		272.945	150.551		98.4515 *	395.834	95.7519 *	21.7755 *	
25-365-TP1A-B	62.9398	39.5122 *		254.245	160.511		89.049 *	400.252			
25-365-TP1A-B-C	65.0223	72.1085 *		251.364	157.305		101.9 *	398.094		10.6738 *	
25-365-TP1A-C	58.713			181.524	144.29		50.29 *	358.676			
25-365-TP1A-C-C	54.2546	39.7788 *		177.57	129.294		49.4044 *	385.863		9.88133 *	
25-365-TP1A-C-C-D	57.5664	31.3888 *		183.52	132.658		65.9011 *	376.003	147.799 *		
25-365-TP1A-C-DUP	64.7342	40.0249 *		181.912	139.268		58.357 *	349.649			
25-365-TP1B-A	64.6299	72.226 *		280.011	174.93		76.0416 *	425.648			
25-365-TP1B-B	52.3706	30.1495 *		206.336	134.355		77.8597 *	363.742	122.651 *	10.9304 *	
25-365-TP1B-C	51.1342			137.292	138.091		87.3515 *	351.384			
25-365-TP1B-D	41.7708			125.064	122.501		76.354 *	286.844	78.8534 *		
25-365-TP1B-E	60.4395	57.6982 *		282.037	141.226		76.5601 *	380.863	91.3633 *		
25-365-TP1C-A	66.9399	46.3313 *		275.041	180.154			461.271			
25-365-TP1D-A	41.2526			100.924	117.449		90.5629 *	322.3			
25-365-TP1D-B	49.6988			177.27	121.017		103.734 *	330.463			
25-365-TP1D-C	51.3725			165.055	135.476		73.5191 *	342.936			
25-365-TP1D-C-C	47.5619			167.216	131.793		74.118 *	340.133			
25-365-TP2A-A	52.6299			64.5266	112.261		68.7086 *	370.717	87.0377 *		7.17221 *
25-365-TP2A-B	48.7679			99.944	116.822		65.1803 *	348.263			
25-365-TP2A-C	54.0494	47.4298 *		227.671	146.925		77.3933 *	440.482	115.265 *	11.1711 *	
25-365-TP2B-C	56.8517			155.078	135.77		74.9536 *	388.877			
25-365-TP2-B	60.4386			150.586	133.695		71.0126 *	403.624	87.659 *	9.93529 *	
25-365-TP3A-A	78.9958	167.553		422.746	199.616		121.097 *	461.313			8.19159 *
25-365-TP3A-B	76.1398	102.212 *		442.785	178.564		113.34 *	440.818		14.5106 *	
25-365-TP4A-A	57.7272			107.054	115.919		46.4248 *	348.168			
25-365-TP4A-B	66.9884	62.9986 *		222.437	152.731		56.5457 *	458.22			
25-365-TP-1-COMP	58.3662	33.3442 *		224.582	150.859		64.8049 *	435.077	113.11 *		
25-365-TP-2-COMP	56.4306			185.388	139.945		94.4707 *	385.354			
25-365-TP-4-COMP	54.6016			116.75	119.554		60.3039 *	428.063	126.621 *		

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

GOLDSIL MILLSITE
PA NO. 25-365

AIMSS SCORESHEET

SITE NAME: GOLDSIL MILLSITE
PA NUMBER: 25-365

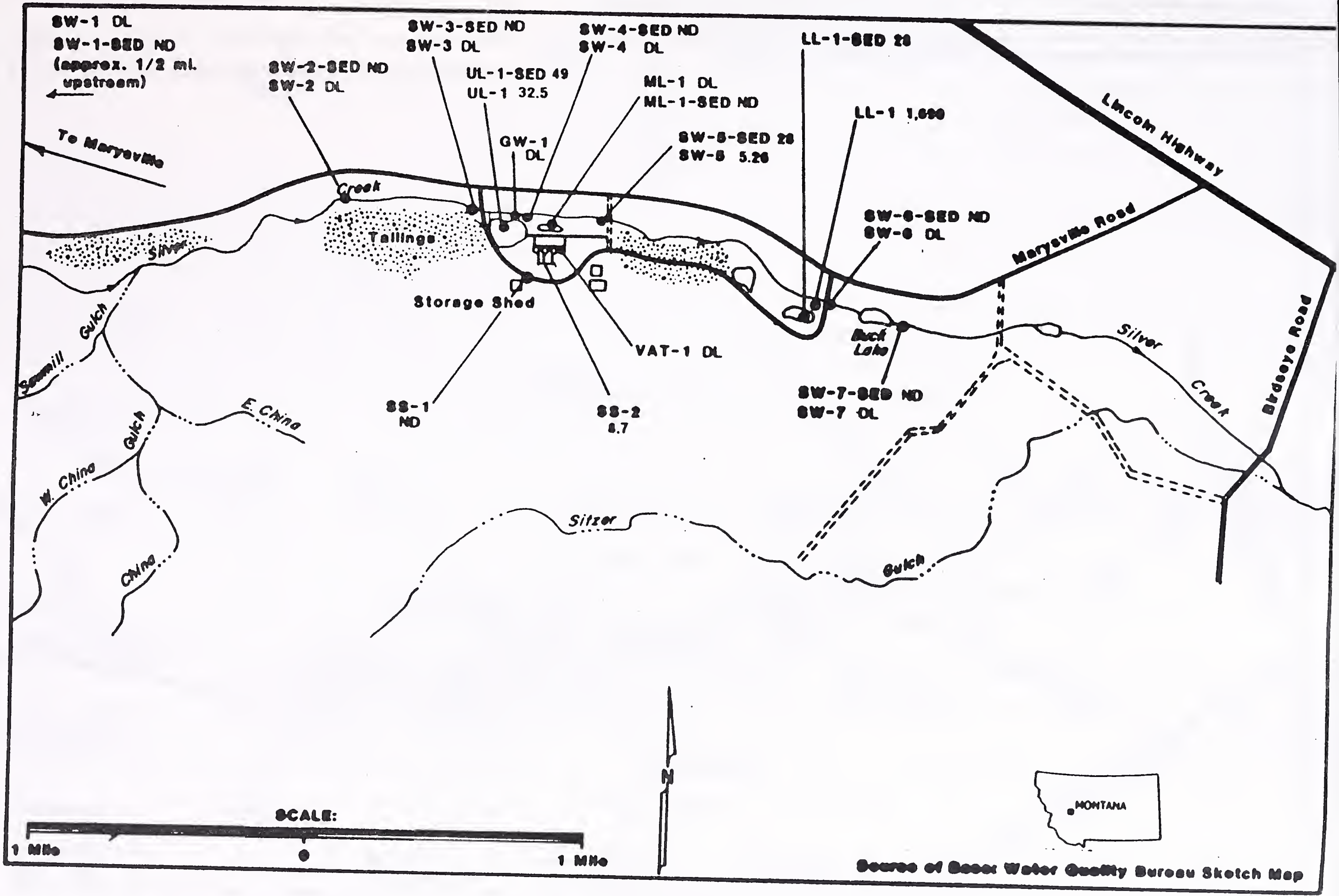
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	130.612
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		309
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	316.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	16535479
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	171.775
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1511620
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.186
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	3558
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	75
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.941
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	423
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**180.51**

SITE NAME: GOLDSIL MILLSITE
PA NUMBER: 25-365

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		50
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	190
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**5.70**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

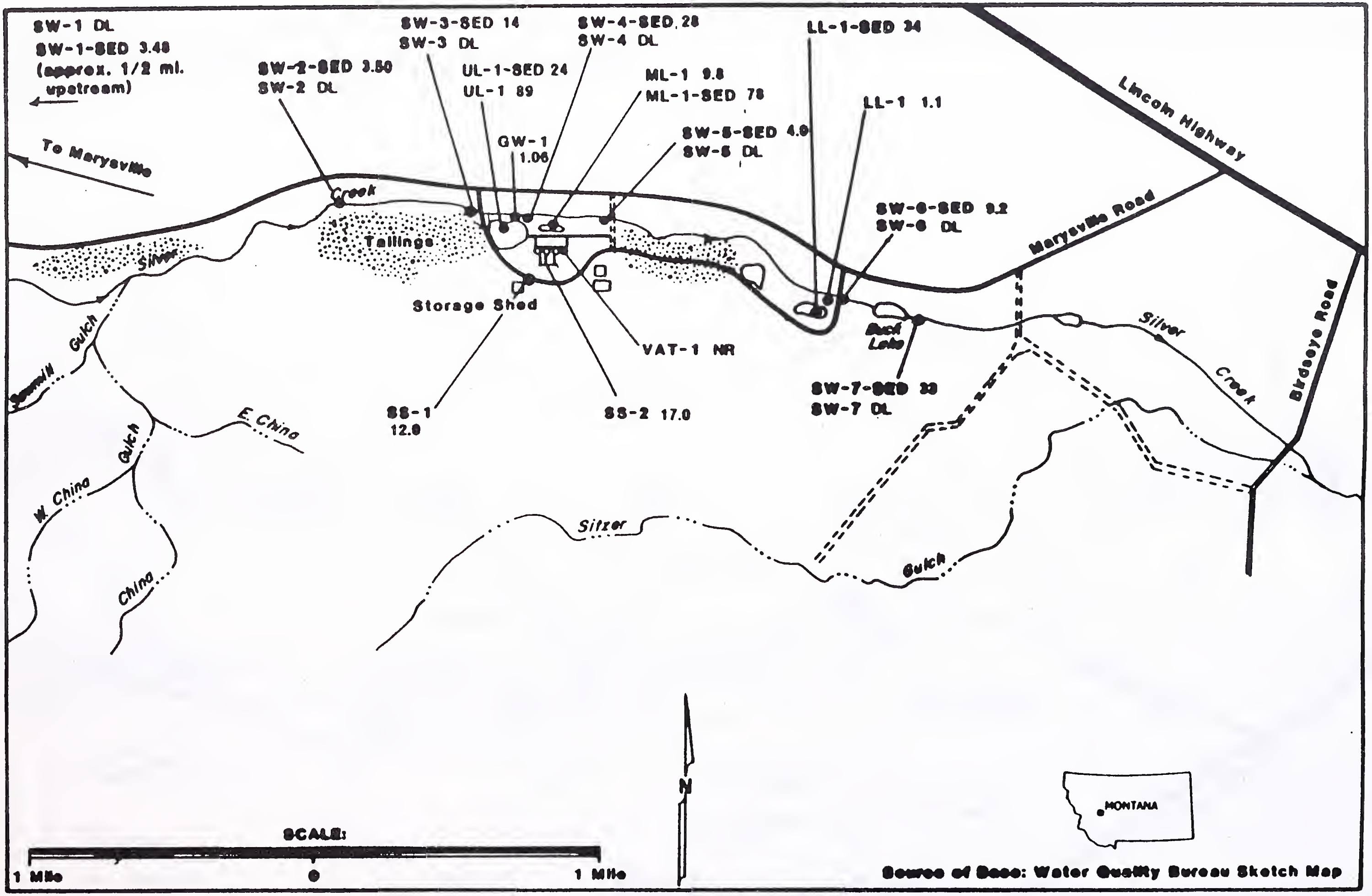


Source of Base: Water Quality Bureau Sketch Map

ND Not Detected
DL Below Laboratory Detection Limits

Figure 3
Cyanide Concentrations

Soil Concentrations: MG/KG
Aqueous Concentrations: UG/L



DL Below Laboratory Detection Limits
NR Not Requested

Figure 4
Mercury Concentrations

Soil Concentrations: MG/KG
Aqueous Concentrations: UG/L

Table 2
GOLDSIL RANCHERS SITE, MONTANA
(Samples collected: 09/01/87 - 09/03/87)
TABLE OF ANALYTICAL RESULTS
SURFACE WATER, GROUND WATER, AQUEOUS WASTE SAMPLES
(MICROGRAMS PER LITER)

SAMPLE LOCATION	SAMPLE NO.	T.CN	F.CN	Hg	As	Pb	Al	Sb	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Mg	Mn	Ni	K	Se	Ag	Na	Tl	V	Zn
Silver Creek, 3 mi. w. downstream entrance	SW-1	*	NR	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Silver Creek, .9 mi. w. downstream entrance	SW-2	*	NR	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Silver Creek, at upstream entrance	SW-3	*	*	*	*	16.8	*	*	*	*	*	53,200	*	*	*	*	8,350	*	*	*	*	*	*	*	*	*
Silver Creek, s.e. corner upper lagoon	SW-4	*	NR	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Silver Creek, at downstream entrance	SW-5	5.26	NR	*	*	6.9	*	*	*	*	*	58,000	*	*	*	*	12,300	25	*	*	*	*	*	*	*	*
Silver Creek, just downstream from lower lagoon	SW-6	*	*	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Silver Creek, just downstream from Buck Lake	SW-7	*	NR	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sump, near upper lagoon	GW-1	*	NR	1.04	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Field Blank	GW-FB	*	NR	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Process Vat, Eastern	VAT-1	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lagoon, Upstream from mill	UL-1	32.5	NR	89	21.5	8.1	3,330	276	*	*	10	17,200	16	*	1,160	6,070	5,110	504	40	16,000	12.5	269	154,000	*	*	2040
Lagoon, just north of mill	ML-1	*	NR	9.8	74.5	17.3	*	*	*	*	*	15,200	19	*	35	294	5,000	19	*	*	*	*	*	*	*	38
Lower Lagoon, Seep at base of Lagoon	LL-1	1,690	NR	1.1	*	*	*	*	*	*	7	69,400	*	*	*	358	22,900	98	*	*	*	*	8,210	*	*	*
Trip Blank	Trip Blank	*	NR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Detection Limits		5.0	5.0	0.2	10	5.0	200	60	200	5.0	5.0	5,000	10	50	25	100	5,000	15	40	5,000	5.0	10	5,000	10	50	20
Drinking Water Standards		NP	NP	2	50	50	NP	NP	1000	NP	10	NP	50	NP	NP	NP	NP	NP	NP	NP	10	NP	NP	NP	NP	NP

NR - NOT RUN   ND - NOT DETECTED   * - BELOW LABORATORY DETECTION LIMITS   NP - NOT PROMULGATED

Table 2 (continued)
GOLDSIL RANCHERS SITE, MONTANA
(Samples collected: 09/01/87 - 09/03/87)
TABLE OF ANALYTICAL RESULTS (continued)
SOIL AND SEDIMENT SAMPLES
(MILLIGRAMS PER KILOGRAM)

SAMPLE LOCATION	SAMPLE NO.	T.CN	F.CN	Hg	As	Pb	Al	Sb	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Mg	Mn	Ni	K	Se	Ag	Na	Tl	V
Silver Creek, 3 mi. w. downstream entrance	SW-1-Sed	ND	NR	3.40	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	N
Silver Creek, .9 mi. w. downstream entrance	SW-2-Sed	ND	NR	3.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	N
Silver Creek, at upstream entrance	SW-3-Sed	ND	NR	14	69	30	8,160	ND	59	1.5	1.8	25,800	7.0	ND	84	12,900	8,760	527	ND	434	ND	7.0	224	ND	6.
Silver Creek, n.e. corner upper lagoon	SW-4-Sed	ND	NR	20	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	N
Silver Creek, at downstream entrance	SW-5-Sed	20	NR	4.0	76	10.7	5,490	ND	41	ND	2.3	25,700	8.5	ND	33	12,900	10,500	681	ND	704	ND	15.1	372	ND	4.
Silver Creek, just downstream from lower lagoon	SW-6-Sed	ND	NR	9.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	N
Silver Creek, just downstream from Buck Lake	SW-7-Sed	ND	NR	33	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	N
Lagoon, upstream from mill	UL-1-Sed	49	NR	24	65	35	2,730	ND	31	0.9	3.3	17,200	7.9	ND	172	8,020	4,600	666	ND	664	ND	39	1,920	ND	N
Lagoon, just north of mill	ML-1-Sed	ND	NR	78	45	157	8,780	ND	70	2.9	4.8	33,700	14.0	ND	180	17,000	10,400	739	ND	1,720	ND	5.7	449	ND	N
Lagoon, just upstream from Buck Lake	LL-1-Sed	28	NR	34	61	96	3,780	ND	50	3.2	2.8	23,300	13.9	ND	160	12,100	6,400	909	ND	1,120	ND	2.3	1,530	ND	N
Soil composite, from around storage shed	SS-1	ND	NR	12.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	N
Soil composite, from around process vats	SS-2	8.7	NR	17.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	N
Detection Limits		2.5	2.5	0.04	2.0	1.0	40.0	12.0	40.0	1.0	1.0	1000	2.0	10.0	5.0	20.0	1000	3.0	8.0	1000	1.0	2.0	1000	2.0	10.

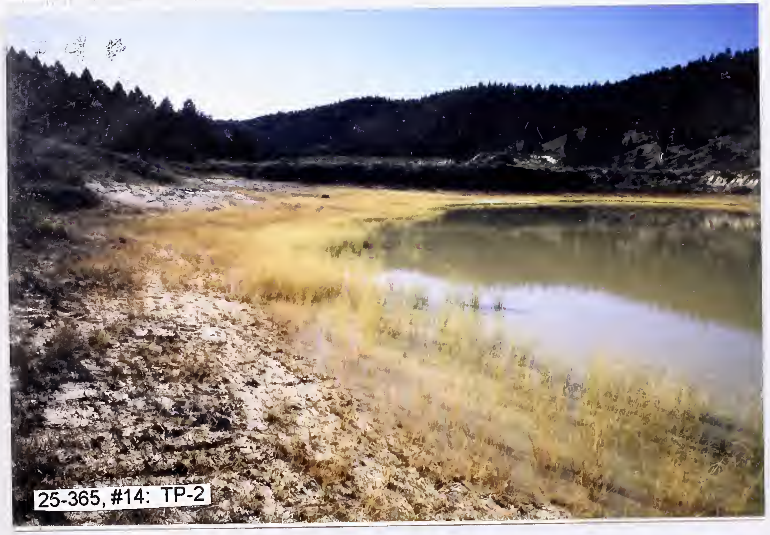
NR - NOT RUN   ND - NOT DETECTED   * - BELOW LABORATORY DETECTION LIMIT

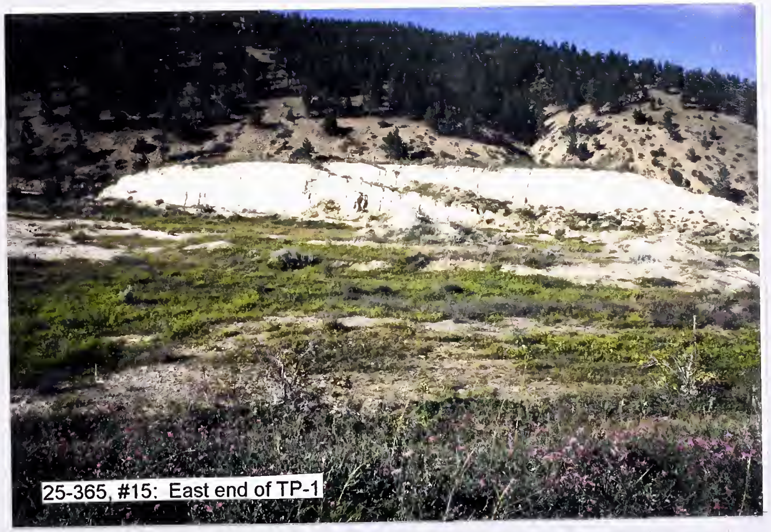
25-365, #10: SW-5 sample location

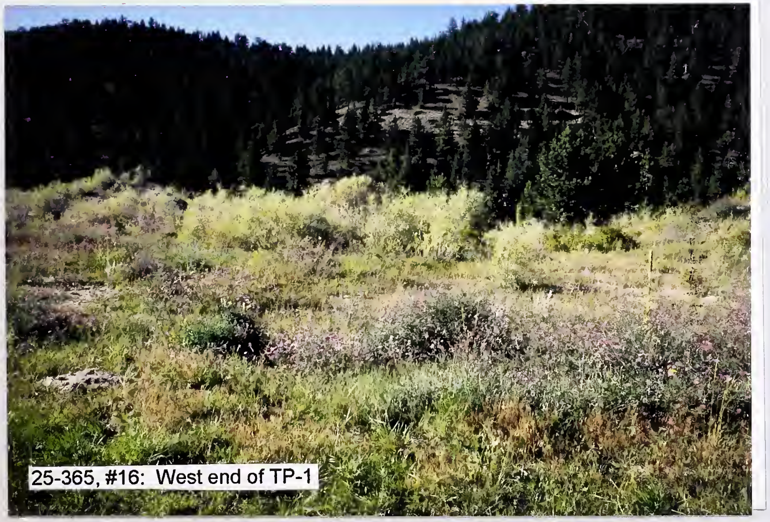
25-365, #11: TP-4

25-365, #12: TP-3

25-365, #13: Mill


25-365, #14: TP-2


25-365, #15: East end of TP-1


25-365, #16: West end of TP-1

Goldsil Millsite
25-365
#11

OPHIR

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): VICTORY/EVENING STAR PA#: 25-010

Legal Description: T 11N ;R 7W ;Sec. 17 , SW1/4 NE1/4 ___1/4

County: LEWIS & CLARK Mining District: OPHIR

Latitude: N 46° 42' 20" Longitude: W 112° 30' 27"

Primary Drainage Basin and Code: Carpenter Creek/17010201
Secondary Drainage Basin: Ophir Creek

USGS Quadrangle map name(s): Ophir Creek

Mine Type/Commodities: Hardrock/Gold, Silver, Copper

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Mary Ann Maras, 308 S. Rodney, Helena, MT 59601; Leslie Bonagura, 65 Durham Rd. #4H, Bronxville Sout, NY 10708; George Bennett, P.O. Box 1705, Helena, MT 59624; Helena National Forest.

Relationship to other mines/sites in the area/district: Other lode deposits in district are the same deposit type.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5900'-6200', Slope 14° ,
Aspect South to west

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 2 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine, Douglas fir, grasses, wildflowers

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Near the NE NW S32 mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on perennial Ophir Creek which flows southwest past the southern end of the site. Ophir Creek meets Carpenter Creek approximately 5 miles south of the site. The site is underlain by limestone of late Paleozoic age; limestone is dolomitic and is brecciated and metamorphosed at the site due to emplacement of porphyritic quartz monzonite.

Mining/milling history, ore type/tenor, host rock, gangue: Deposit was discovered in 1900's; between then and 1912, it produced 10,000 tons of Au. Lode deposit is formed in brecciated limestone near body of quartz monzonite. Ore is in quartz gangue with pyrite, chalcopyrite, and their oxidation products.

Mine Operation?
Shafts - Yes___, No X, # ___, Comment
Adits - Yes X, No___, # 2, Comment Caved
Pits - Yes X, No___, # 6+, Comment Some are 20' deep, open
Placers - Yes X, No___, # 2, Comment Placer tails along Ophir Creek
Other - Yes___, No X, # ___, Comment

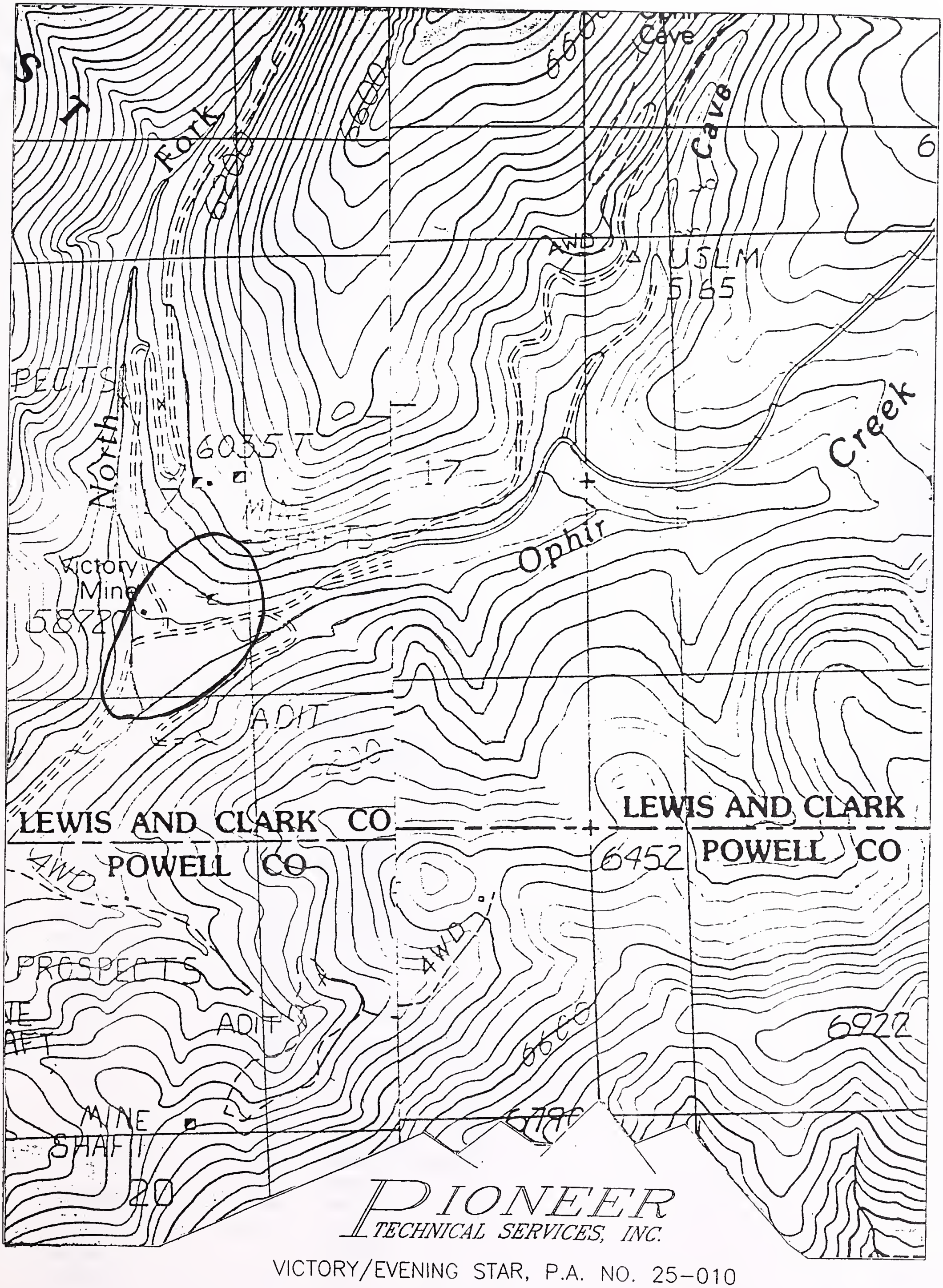
Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: 1900 to Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill X; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
Unknown

Well No.	Location	Depth	Yield	Static Water Level
M:65751	11N 07W 21 CAA	188.0	2.0	115.00

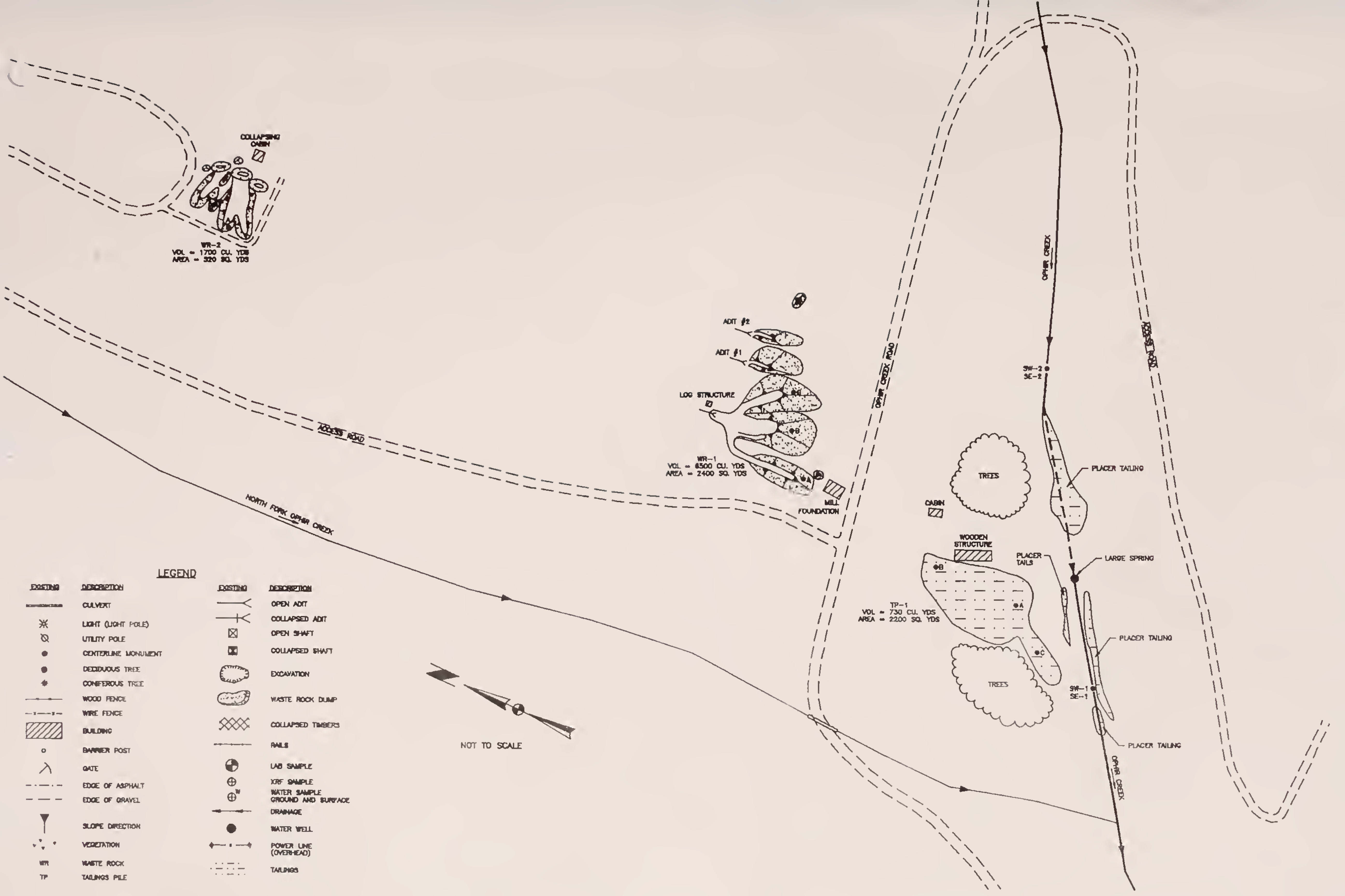


PIONEER TECHNICAL SERVICES, INC.

VICTORY/EVENING STAR, P.A. NO. 25-010

T11N, R07W, SECTION 17

SCALE: 1" = 1000'



25-010.DWG

SHEETS

SHEET NO.

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

VICTORY/EVENING STAR PA# 25-010
OPHIR DISTRICT LEWIS AND CLARK COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. **TAILINGS IMPOUNDMENTS** - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Approx. 10% sand, 50% silt, and 40% clay

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): No stratification; orange oxidized material

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): All tailings were moist from precipitation during investigation.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): No impoundment; possible that most of the tailings originally generated were removed for reprocessing.

Comments on potential for mitigation: Consolidation and encapsulation

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	6,500	Western most lobe	None	5.8 (D)	0.04	25-010-WR-1	07/15/93 2000	T-Metals, ABA
WR-1B	WR		Center (largest) lobe	None	6.7 (D)	0.04			
WR-1C	WR		Lobe east of center lobe	None	6.6 (D)	0.05			
WR-2A	WR	1,700	WR-2; second largest lobe on west	None	6.4 (D)	0.05			
WR-2B	WR		Second lobe in from east	None	6.3 (D)	0.05			
TP-1A-A	TAIL	730	Lower end of TP-1; 0'-1'	None	5.5 (D)	0.05	25-010-TP-1	07/15/93 2016	T-Metals, ABA
TP-1A-B	TAIL		Underlying topsoil	None	4.8 (D)	0.04			
TP-1B-A	TAIL		Upper end; 0-6"	None	5.4 (D)	0.04			
TP-1C-A	TAIL		Streamside tails; 0-8"	None	6.0 (D)	0.05			
SS-1	BKGRND	N/A	Background soil east of WR-1	N/A	N/A	N/A	25-010-SS-1	07/15/93 1700	T-Metals

* D-Direct reading (Kelway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 25-010-WR-1 is composite of WR-1A through -1C, WR-2A and -2B. 25-010-TP-1 is composite of TP-1A-A, TP-1B-A, and TP-1C-A.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map o topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes X , No___, Number: 1 Identification: Ophir Creek

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 23

Distance to nearest well used for drinking? Approx. 2 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Percolation of precipitation through wastes may result in localized contamination.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Flammang, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
Spring	SP	Near bottom of tailings	0.5 cfs (E)	7.71	388	174	6.2	218	N/A	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Ophir Creek

Dry streambeds: Yes X , No ___, Name(s): Ophir Creek is dry in several places along the site; it appears to flow under the placer tailings.

Other surface water: Yes X , No ___, Name(s)/Description: Large pool formed by a seep just southeast of tailings; may be Ophir Creek water reappearing.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1

Approximate Flood frequency? ___1 yr, X 10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? .5 cfs during investigation
High Flow: 5 cfs , Average Flow: 0.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? Approx. 20 feet from tailings to stream.

Surface water draining onto or through waste sources: Yes ____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetlands, stock watering, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 400 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Elevated copper from xrf sediment analysis.

SURFACE WATER INVENTORY FORM

SAMPLERS: Flammang, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downgradient approx. 100 feet from the last tailings pile	7.60	346	177	6.2	231	0.63 cfs (M)	25-010-SW-1	07/15/93 1130	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-1	SE	Downgradient approx. 100 feet from the last tailings pile	N/A	N/A	N/A	N/A	N/A	N/A	25-010-SE-1	07/15/93 1130	T-Metals
SW-2	SW	Upgradient approx. 100 feet from site	7.61	411	178	6.5	253	0.114 cfs (M)	25-010-SW-2	07/15/93 1200	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-2	SE	Upgradient approx. 100 feet from site	N/A	N/A	N/A	N/A	N/A	N/A	25-010-SE-2	07/15/93 1200	T-Metals
SE-500	SE	500 feet downgradient from SE-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-1000	SE	1,000 feet downgradient from SE-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 to 2 acres by tailings and below WR-1

Wetlands present: Yes X , No ___ , Describe: Small wetlands are presen between the placer piles downstream from the mine.

Carbonate rocks/soils: Yes X , No ___ , Describe: Dolomite

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 X ; 30-100 ___; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments ___

Nearest residence(ft or miles)? Approx. 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; pH	Dry	21,600	20,500	Yes	Low
WR-2	FEOX	Dry	4,680	1,400	No	None
TP-1	pH	Partial	19,800	0	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe: Beer cans; campers < 200 feet from site present during investigation.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes___, No_X_, Comment______

Primary Drainage___; Secondary Drainage___; No Information_X_:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes_X_, No___, Number 2 , types and locations: Cabin at Victory mine; mill building debris

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number 5 , types and locations: All five are located up at the Victory mine.

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number 1 , types and locations: WR-1 has unvegetated slopes at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Victory Mine/Evening Star, Prepared by Daphne Digrindakis, July 17, 1984.

MDSL/AMRB Files, Department of the Interior, Office of Surface Mining, Abandoned Mine Lands Inventory Update Form, Prepared by Daphne Digrindakis, November 20, 1984.

USGS, Greater Helena Mining Region, Bulletin 842, Author unknown, Date unknown, pp. 28-34.

USGS, Topographic Map, Ophir Creek, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

VICTORY/EVENING STAR
PA NO. 25-010

Victory/Evening Star PA# 25-010
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/15/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-010-SE-1	36 J	52.9	1.9 U	7.1 U	11.2	490 JX	15200	2.91 J	129	9 UJX	31 J	22 UJ	57 J	NR
25-010-SE-2	6 U	72.9	0.7 U	7	13.2	28	10300	0.137	186	17	14	8 UJ	32	NR
25-010-TP-1	566	236	5.2	16.5	38.9	5590	95600	6.07	1060	21	23	15 J	143	NR
25-010-WR-1	163	164	1.9	14.3	42.4	1050	29900	1.08	469	40	8	5 UJ	36	NR
BACKGROUND	71	312	5.6	13	18	224	15800	0.296	1570	15	156	9 UJ	240	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-010-TP-1	0.12	3.75	132	128	0.09	0.01	0.02	0.31	132
25-010-WR-1DUP	1.63	50.9	456	405	<0.01	0.97	1.62	30.3	426
25-010-WR-1	1.61	50.3	464	414	<0.01	1.37	1.54	42.8	422

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-010-SW-1	1.61 J	19.60	2.57 U	9.70 U	6.83 U	3.57	11.8 U	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	244
25-010-SW-2	2.11 J	18.90	2.57 U	9.70 U	6.83 U	1.55 U	11.8 U	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	246

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-010-SW-1	255	< 5.0	9	< 0.05	< 0.01
25-010-SW-2	256	< 5.0	8	< 0.05	< 0.01

LEGEND

SE1 - Downgradient approx. 100' from last tailings pile.
SE2 - Upgradient of site approx. 100'.
TP1 - Composite of subsamples TP1A-A, 1B-A, and 1C-A.
WR1 - Composite of subsamples WR1A, 1B, 1C, 2A, and 2B.
BACKGROUND - From the Victory/Evening Star (25-010-SS-1).
WR1DUP - Duplicate of the 25-010-WR-1 sample.
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

VICTORY/EVENING STAR
PA NO. 25-010

MDSL AMRB/PIONEER 4/9/93

Mine Name: Victory/Evening Star PA# 25-010
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-010-SE-1000		12365.1	42469.2	1652.04	169.633 *	622.407 *	22288		107.288 *	128.893	70.2702 *	184.587
25-010-SE-500		6527.67	31479	827.022	191.146 *	317.86 *	27497.6	292.935 *	706.385	138.368	85.3027 *	154.386
25-010-SS-1		8192.23	17939.4	1506.79		2329.63	22843.6		179.075	264.654	109.443	304.703
25-010-TP1A-A		18317.4	38679.3	1300.73		1311.68 *	109525	717.864 *	5647.83	171.415 *	829.271	116.419
25-010-TP1A-B		10897.6	17239.5	1855.4		402.009 *	21178.7		110.581 *	122.489 *	46.9127 *	169.742
25-010-TP1B-A		22486.7	39389.4	1319.96		812.565 *	66897.3		2060.81	127.016 *	360.803	143.423
25-010-TP1C-A		21839.2	42003.6	1534.14		1135.78 *	65391.3		3319.2	572.094	479.209	136.214
25-010-TP-1-COMP		18750.6	37364.1	1185.68		1430.7	91676.6		4474.06	235.501	626.979	121.141
25-010-WR1-A		14023.4	86491.1	1480.38	178.803 *	571.898 *	35545.4		1370.1	142.414	264.853	195.25
25-010-WR1-B			134942	193.837 *		254.494 *	39560.7		3159.02	171.98	438.711	51.8267
25-010-WR1-C		9852.26	47220.6	2324		791.197 *	45504.2		197.168	127.221	59.9014 *	346.299
25-010-WR2-A		14778.7	30731.2	1341.31		1873.94	64347.9			121.28 *	103.083	210.526
25-010-WR2-B		9582.87	93371.3	862.488		434.831 *	23500.7			108.328 *		58.7203
25-010-WR-1-COMP		8547.83	70892.4	1350.08		990.055 *	43361.6		1264.68	139.011	202.941	151.455

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-010-SE-1000	128.783				62.8125			445.644			10.067 *
25-010-SE-500	68.4881				65.4669			262.654			10.9579 *
25-010-SS-1	83.9069			61.9758 *	58.2397			253.32			
25-010-TP1A-A	83.9958				89.8104			705.528			7.82872 *
25-010-TP1A-B	214.321				98.4225			465.186		14.4247 *	15.8562 *
25-010-TP1B-A	124.349				88.0054			793.778			15.2724 *
25-010-TP1C-A	116.641				94.5806			709.379			14.8527 *
25-010-TP-1-COMP	97.0818				77.3998			704.026			13.5581 *
25-010-WR1-A	74.6727				98.5622			227.339			9.83561 *
25-010-WR1-B	15.501		3.67865 *								11.8043 *
25-010-WR1-C	54.8034				61.3765			506.588			7.27821 *
25-010-WR2-A	133.593				88.1807			1012.09			8.69322 *
25-010-WR2-B	45.2756				81.4766			108.155			4.84215 *
25-010-WR-1-COMP	57.3892				64.204			359.318			9.28542 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

VICTORY/EVENING STAR
PA NO. 25-010

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: VICTORY/EVENING STAR
PA NUMBER: 25-010

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.587
6		WELLS - 1 MI. x 2.5		2.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		22
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	24.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	5753

SURFACE WATER PATHWAY

11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.699
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	13
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	6361

AIR PATHWAY

25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.017
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	9

DIRECT CONTACT PATHWAY

36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.014
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	10
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	21

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.12**

SITE NAME: VICTORY/EVENING STAR
PA NUMBER: 25-010

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2	HAZARDS	OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4		UNSTAB. HIWALLS / PITS	75 EA.	375
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	455
9	TARGETS	POPULATION - 1 MILE		0
10		NEAREST RESIDENCE		0
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	10
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**91.00**

25-010, #7: Western lobe on WR-2

25-010, #8: WR-2, facing north

25-010, #9: Collapsed mill building and WR-1

25-010, #12: Spring in drainage near bottom of tailings, facing south

25-010, #13: SW-2 and SE-2 sample location, facing south

25-010, #14: TP-1 (well vegetated)

25-010, #15: TP-1B hole in TP-1

RIMINI

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: TENMILE MINE PA#: 25-005

Date: July 15, 1993 Time: 0815-1450

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Rain in morning; partly cloudy in afternoon; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #22: WR-2; #23: HMO Adit #3; #24: WR-3; #25: HMO Adit #4; #26: WR-4; #27: Adit #5, GW-1 location; #28-#30: Reclaimed dumps from below; #31: WR-1 from below; #32-#34: WR-1 from top; #35: Adit #1 discharge; #36: Ore bin; #37: Adit #6. Roll #2: #23: Washout of WR-1 and reclaimed area. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Lower part of site is well reclaimed. Upper part of site has steep slopes for remediation on upper dumps; not much material due to thickness, but very mineralized; amend and revegetate. Close adits; upper adit "blowout" in July after this site investigation.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): TENMILE MINE PA#: 25-005

Legal Description: T 8N ;R 5W ;Sec. 5 ,SE 1/4SE 1/4 ___1/4

County: LEWIS & CLARK Mining District: RIMINI

Latitude: N 46° 28' 20" Longitude: W 112° 14' 30"

Primary Drainage Basin and Code: Ten Mile Creek/10030101
Secondary Drainage Basin: Ten Mile Creek

USGS Quadrangle map name(s): Chessman Reservoir

Mine Type/Commodities: Hardrock/Gold, Silver, Lead

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Bruce Toomey, Box 3065, Paso Robles, CA 93447; Helena National Forest.

Relationship to other mines/sites in the area/district: Red Water, Red Mountain, and Valley Forge mines are of the same type; other mines to the south.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Reclamation activities on lower dumps and adit by MDSL.

General site features: Elevation 5600-6000', Slope 30°-35°, Aspect West

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 4.1 acres.
Dimensions: 300 feet x 600 feet

Predominant vegetation types: Lodgepole pine, fir, grasses

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 13 well logs within a 1 mile radius. Trailer home located 1/4 mile north of the site uses an old adit for water supply. Site is located approx. 1 mile above the town of Rimini and the Helena water intake.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies just above perennial Ten Mile Creek. Ten Mile Creek is a source of Helena's water supply. The dominant rock in the area is the quartz monzonite of the Boulder Batholith. Groundwater in the area is reported to be shallow.

Mining/milling history, ore type/tenor, host rock, gangue: Mining began in the area in the 1860's. Ore bodies in the area are auriferous silver-lead bearing enclosed in the quartz monzonite. Principle ore mineral is galena, accompanied by sphalerite and pyrite, with subordinate arsenopyrite and tetrahedrite.

Mine Operation?

Shafts - Yes___, No X , # ____, Comment____

Adits - Yes X , No___, # 9 , Comment 7 caved; 2 open; 2 with water

Pits - Yes___, No X , # ____, Comment____

Placers - Yes___, No X , # ____, Comment____

Other - Yes___, No X , # ____, Comment____

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

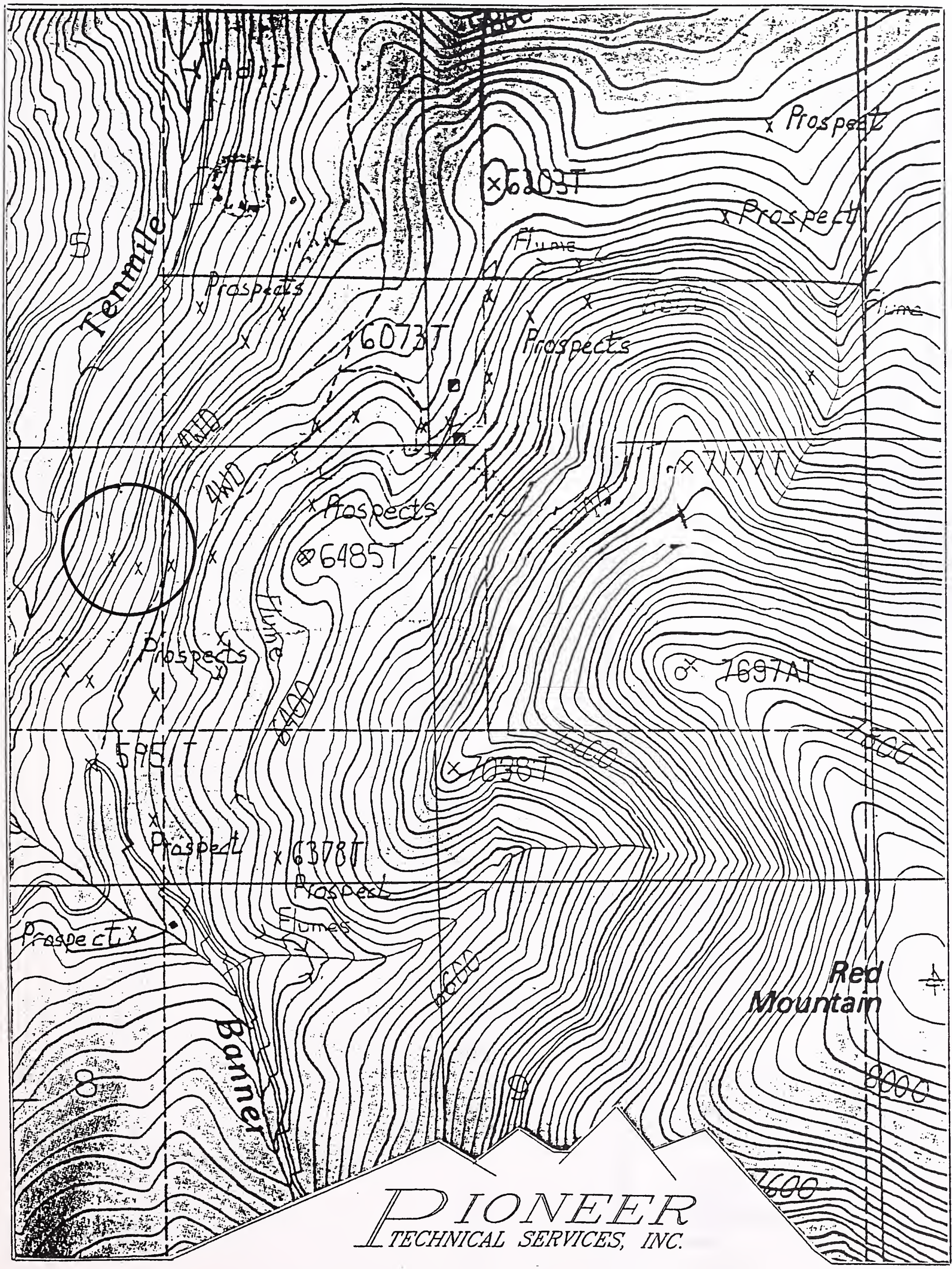
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

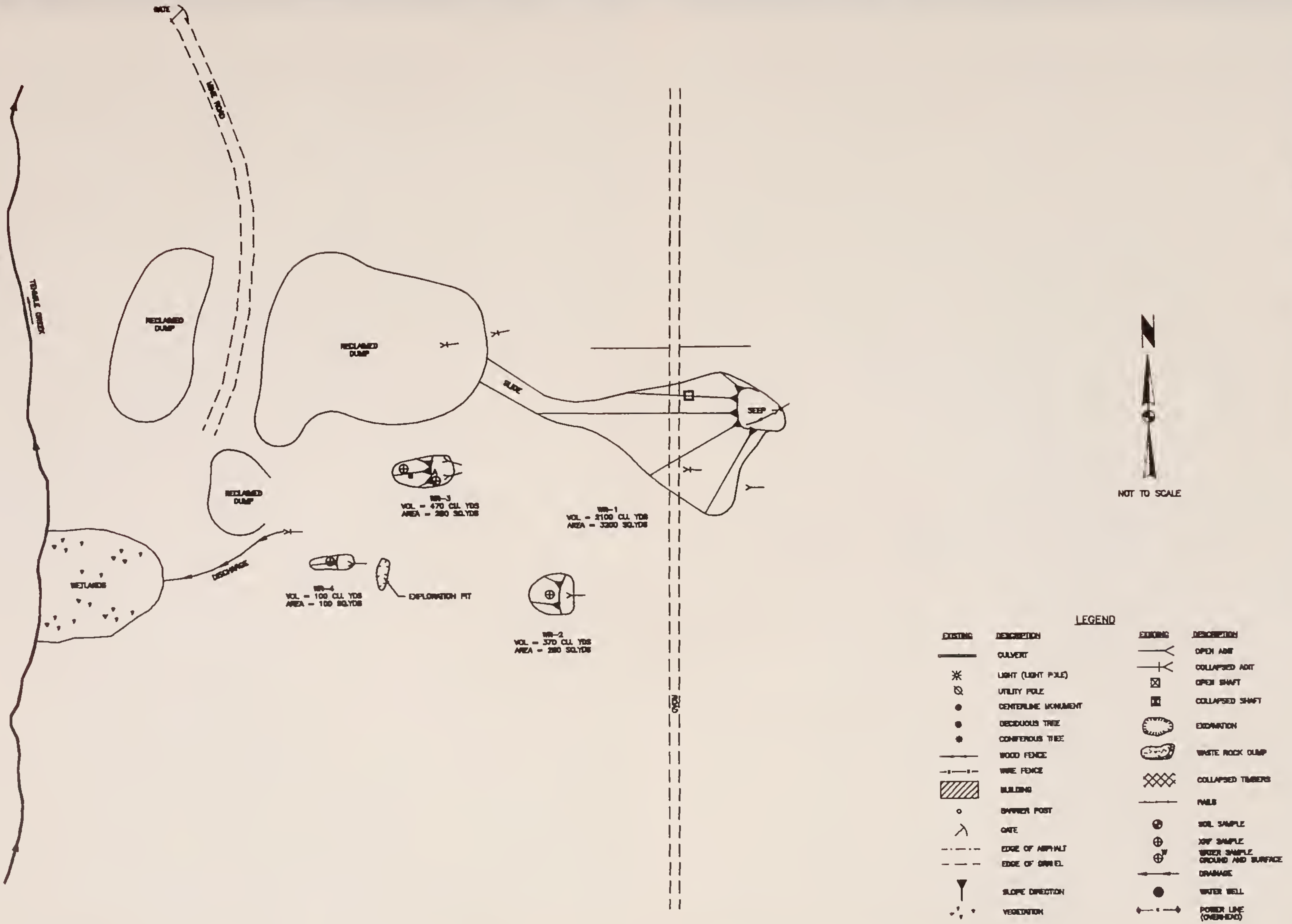
10/29/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123817	08N 05W 04 BA	120.0	30.0	35.00
M:59174	09N 05W 32	62.0	30.0	7.00
M:59175	09N 05W 32 CC	25.0	20.0	0.00
M:59176	09N 05W 32 DAA	29.0	24.0	16.00
M:59177	09N 05W 33	63.0	0.0	10.00
M:131277	09N 05W 33	100.0	12.0	39.00
M:59178	09N 05W 33	35.0	30.0	0.00
M:59180	09N 05W 33	26.0	15.0	6.00
M:59179	09N 05W 33	44.0	20.0	10.00
M:59181	09N 05W 33 CB	80.0	20.0	15.00
M:123830	09N 05W 33 CC	160.0	15.0	25.00
M:123829	09N 05W 33 CC	60.0	20.0	20.00
M:59182	09N 05W 33 CDCC	29.0	12.0	18.00



PIONEER
TECHNICAL SERVICES, INC.

TENMILE, P.A. NO. 25-005
T08N, R05W, SECTION 05
SCALE: 1" = 1000'



DRAWN WMC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TDH

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

TEN MILE PA# 25-005
RIMINI DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-005.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,100	Upper dump with loadout not reclaimed; upper, center	None	5.2 (D)	0.04	25-005-WR-1	07/15/93 1500	T-Metals, ABA
WR-1B	WR		Upper dump with loadout not reclaimed; lower, north	None	3.6 (D)	0.05			
WR-1C	WR		Upper dump with loadout not reclaimed; lower, south	None	5.4 (D)	0.05			
WR-2	WR	370	Southwest of WR-1, small dump with Adit #2	None	5.6 (D)	0.03			
WR-3A	WR	470	West of WR-1, south of reclaimed site, medium dump with two adits	None	4.4 (D)	0.05	25-005-WR-2	07/15/93 1510	T-Metals, ABA
WR-3B	WR		West of WR-1, south of reclaimed site, medium dump with two adits; western portion	None	4.6 (D)	0.04			
WR-4	WR	100	Small dump with Adit #4, east of discharging adits	None	3.6 (D)	0.05			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-005-WR-1 is composite of WR-1A through -1C. 25-005-WR-2 is composite of WR-3A and -3B, and WR-4.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No ___, Number: 2 Identification: Adit #1 and Adit #5

Filled shafts: Yes ___, No X, Number: ____ Identification: __________

Seeps/Springs: Yes ___, No X, Number: ____ Identification: __________

Groundwater wells within 5 miles?: Yes X, No ___;
Number of well logs: 259

Distance to nearest well used for drinking? Some houses along Ten Mile Creek

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ____, Probable ____, Possible X, Unlikely ____.
Poor buffering capacity of soils, steep slopes, and uncontained waste rock on upper dump.

Other observations/notes: Three wells were identified as Helena Water Supply wells. One well supplies a church, three wells are Helena National Forest wells (may be at campgrounds), and two wells belong to Montana Department of Transportation.

GROUNDWATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit #5 discharge	2 gpm (E)	8.39	520	163.4	7.1	64	N/A	25-005-GW-1	07/15/93 1300	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	AD	Adit #1 discharge	0.25 gpm (E)	6.29	750	168.4	7.4	NM	N/A	N/A	N/A	Field Parameters

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Tenmile Creek is below the site.

Dry streambeds: Yes ___, No X, Name(s):

Other surface water: Yes ___, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No ___ Source ID(s): Reclaimed dump toe in Tenmile Creek floodplain.

Approximate Flood frequency? ___1 yr, X 10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 18 during investigation
High Flow: 1800 cfs, Average Flow: 17.4 cfs

Distance between waste source(s) and nearest surface water body (ft)? 20 feet from the reclaimed dump to Tenmile Creek.

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Adit #1 discharges into WR-1 but does not re-emerge.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Helena drinking water intake, fisheries, recreation, agriculture, wetlands, possible irrigation and residential

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1/2 acre

Wetlands present: Yes X , No ___, Describe: On east side of reclaimed site where lower (reclaimed) adit discharges; approx. 1 acre.

Carbonate rocks/soils: Yes ___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 0.5 mile from site

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX; Sulfides; pH	Dry	28,800	28,800	Yes	Low
WR-2	FEOX; Sulfides; pH	Dry	2,250	1,800	Yes	Low
WR-3	FEOX; Sulfides; pH	Dry	2,520	2,016	Yes	Low
WR-4	FEOX; Sulfides; pH	Dry	900	630	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_Litter_

Accessibility - Fences, warning signs, closed roads?_Closed and gated road to base of dump (not locked); open road to top of site._

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes_X_, No___, Comment_Peregrine Falcon_
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:___
Adits #3 and #4

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Wooden ore loadout bin (logs) are leaning downhill.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations:_WR-1 is very steep and unstable._

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Tenmile Mine, Prepared by RPA, July 15, 1988.

MDSL/AMRB Files, Problem Area Data Sheet for the Tenmile Mine, Prepared by Mark Carlstrom and Ben Mundie, November 15, 1979.

USGS, Ore Deposits of the Helena Mining Region, Montana, Bulletin 527, Author Unknown, Date Unknown, pp. 81-85.

USGS, Topographic Map, Chessman Reservoir, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

TENMILE MINE
PA NO. 25-005

Tenmile PA# 25-005
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER -- TUESDAY
INVESTIGATION DATE: 07/15/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-005-WR-1	1990	17.6	5	5.1	2.8	231	19900	0.634	437	3	2390	37 J	631	NR
25-005-WR-2	5530	69.6	14.3	10.6	3.4	136	32000	0.231	2220	2 U	3220	10 J	989	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-005-WR-1	0.17	5.31	0.34	4.97	0.17	<0.01	0.01	0	0.34
25-005-WR-2DUF	0.48	15	0.22	–14.	0.24	0.1	0.14	3.12	–2.9
25-005-WR-2	0.47	14.7	0.38	–14.	0.27	0.07	0.13	2.19	–1.81

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-005-GW-1	92.7 J	3.70	10.20 J	9.70 U	6.83 U	10.70	297	0.038 U	858	12.7 U	13 J	30.7 U	2050	209

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-005-GW-1	335	< 5.0	157	0.39	NR

LEGEND

WR1 – Composite of subsamples WR1A through 1C.
WR2 – Composite of subsamples WR3A, 3B, and 4.
BACKGROUND – From the Red Water Mine (25-007-SS-1).
WR2DUP – Duplicate of sample 25-005-WR-2.
GW1 – Adit #5 discharge.

XRF ANALYSIS RESULTS

TENMILE MINE
PA NO. 25-005

MDSL AMRB/PIONEER 4/9/93

Mine Name: Tenmile PA# 25-005
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-005-WR1-A		25184	2009.26	3390.89		349.232 *	48179.6		172.248 *	905.63	4153.23	129.366
25-005-WR1-B		25688.2	2683.75	2150.77		901.597 *	40228.5		441.058	756.76	3491.63	160.426
25-005-WR1-C			2741.96	2220.5		2300.96	29052.2		86.1435 *	1443.61	934.632	131.039
25-005-WR3-A			3629.05	1775.04		5186.02	33633.6			1579.35	583.882	196.887
25-005-WR3-B			2071.74	2330.9		1389	44018.3		153.489 *	631.229	5962.87	177.613
25-005-WR-1-COMP			2163.26	2366.96		977.181 *	36592.4		235.566	1028	2710.05	139.148
25-005-WR-2			1861.52	1390.85		2474.56	33113.8		151.386 *	612.793	2740.33	109.952
25-005-WR-2-COMP			2457.54	1808.61		3333.73	46735		59.7795 *	916.148	6871.24	176.956
25-005-WR-4			1715.77	1320.78		2076.74	64240.4		167.668 *	857.706	14316.8	118.553

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-005-WR1-A	225.326			1106.7	255.22		72.0593 *	510.929			27.3214 *
25-005-WR1-B	183.514		13.1278 *	4037.72	234.639		420.009	341.257	140.649 *		25.8102 *
25-005-WR1-C	214.597			1381.1	261.259		65.7137 *	445.43			20.1276 *
25-005-WR3-A	180.655		6.1641 *	316.84	240.801			681.003			14.5277 *
25-005-WR3-B	169.102		17.9528 *	4410.43	214.003		71.0053 *	531.453	117.43 *		21.3314 *
25-005-WR-1-COMP	223.07		10.3686 *	2155.31	254.721		157.831	388.703	83.8621 *		27.3432 *
25-005-WR-2	134.515		11.4502 *	5174	233.02		58.7161 *	387.765	94.5904 *		26.0848 *
25-005-WR-2-COMP	161.752		13.9567 *	3152.86	232.505		52.2725 *	530.074	114.136 *		
25-005-WR-4	143.04		11.1879 *	4504.78	230.673		72.8419 *	410.558	170.496 *		18.0789 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

TENMILE
PA NO. 25-005

AIMSS SCORESHEET

SITE NAME: TENMILE MINE
PA NUMBER: 25-005

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.944
6	GW - TARGETS	WELLS - 1 MI. x 2.5		32.5
7		WELLS - 1 TO 4 MI		246
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	283.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	787450

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	7.278
16	SW - TARGETS	DRINKING WATER POP'N		2450
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	2473
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	7199398

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.530
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	2120

DIRECT CONTACT PATHWAY

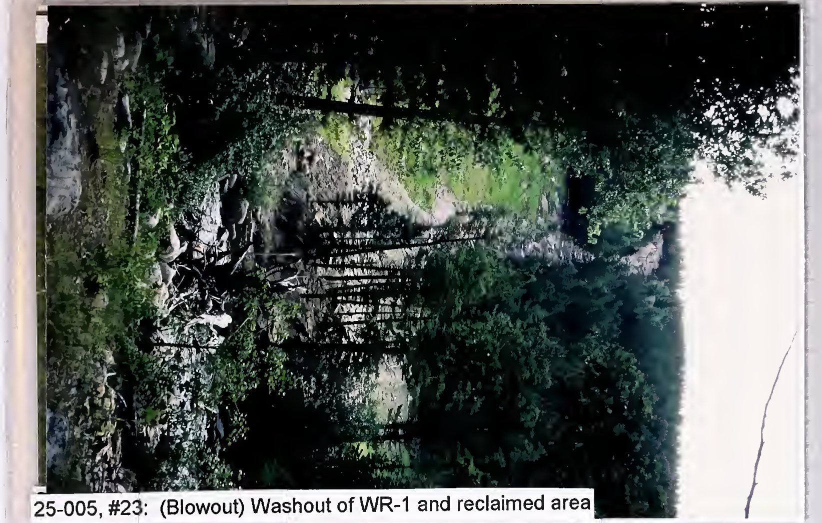
LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.504
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 - 42	17
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1285

LINE NO.		
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**79.90**

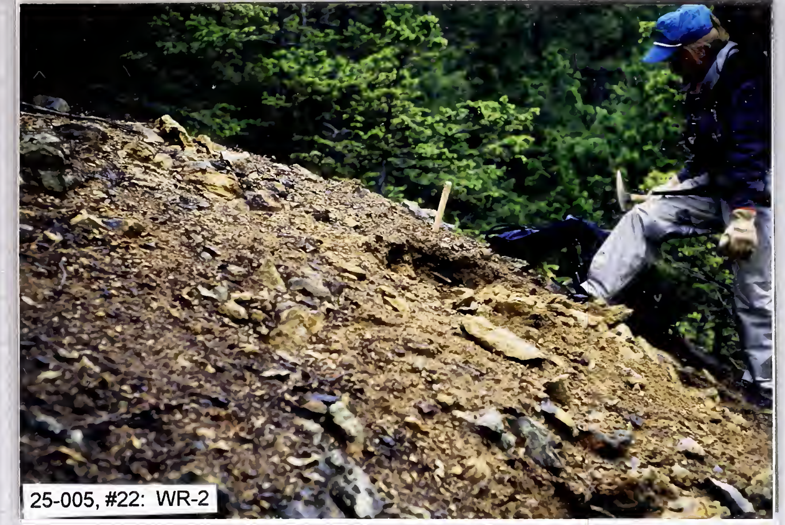
SITE NAME: TENMILE MINE
PA NUMBER: 25-005

SITE SAFETY

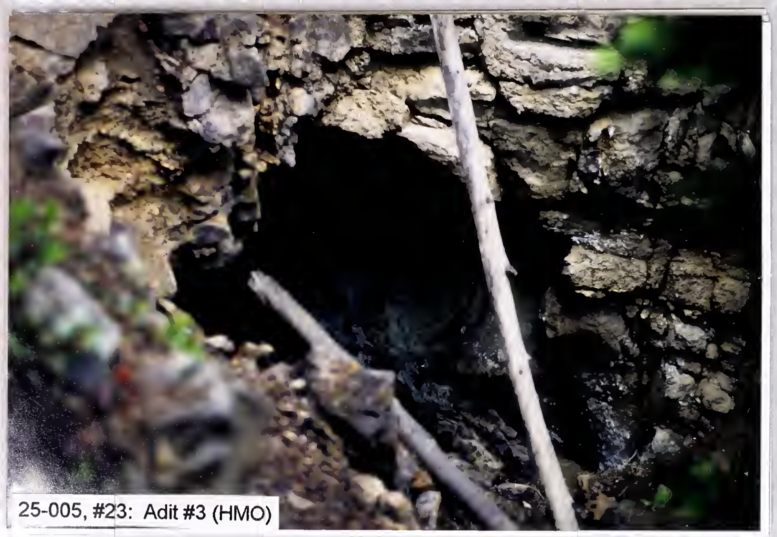
LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	140
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 - 11	17
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**23.80**



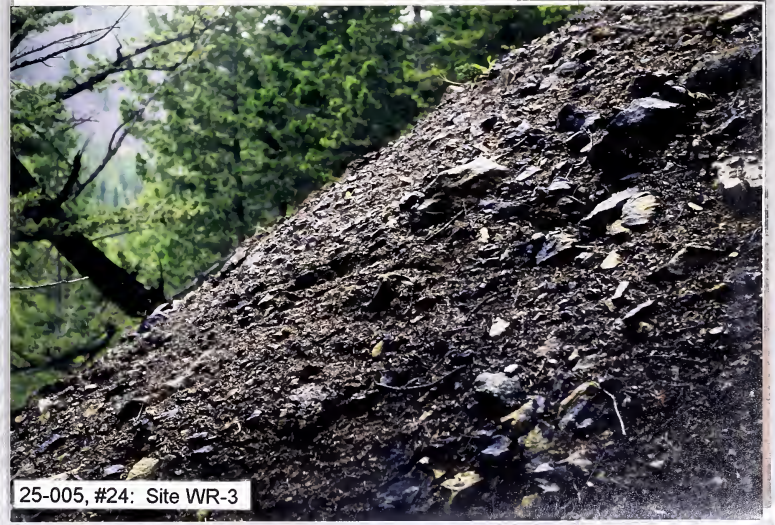
25-005, #23: (Blowout) Washout of WR-1 and reclaimed area



25-005, #22: WR-2



25-005, #23: Adit #3 (HMO)



25-005, #24: Site WR-3

25-005, #25: Adit #4 (HMO)

25-005, #26: WR-4

25-005, #27: Adit #5; GW-1 sample location

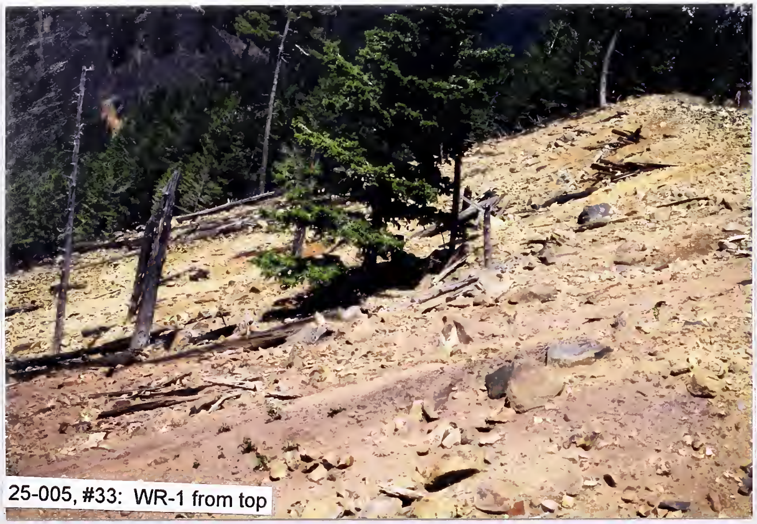
25-005, #28: Reclaimed dumps from below

25-005, #29: Reclaimed dumps from below

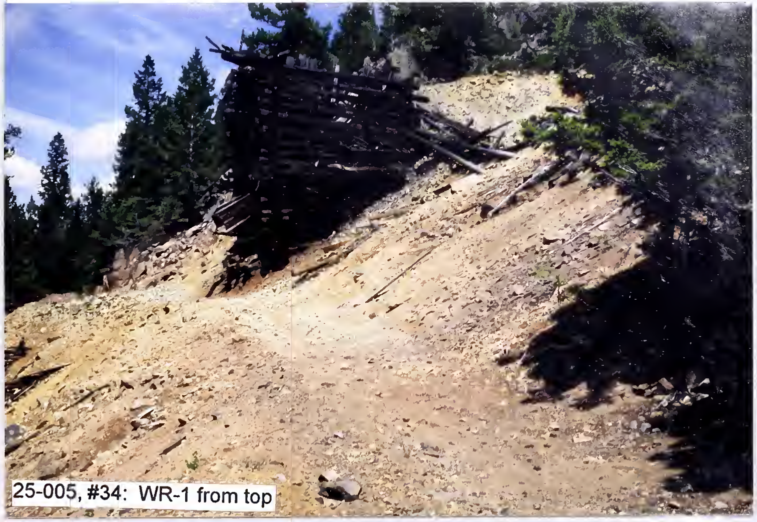
25-005, #30: Reclaimed dumps from below

25-005, #31: Waste rock dump from below

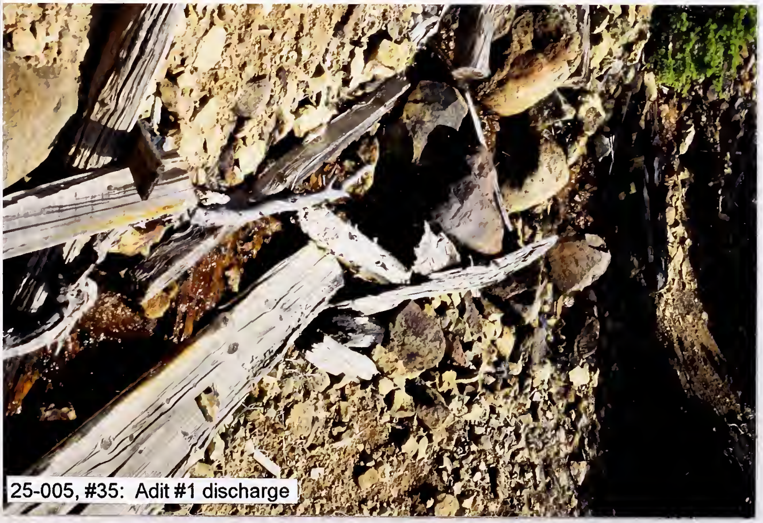
25-005, #32: WR-1 from top



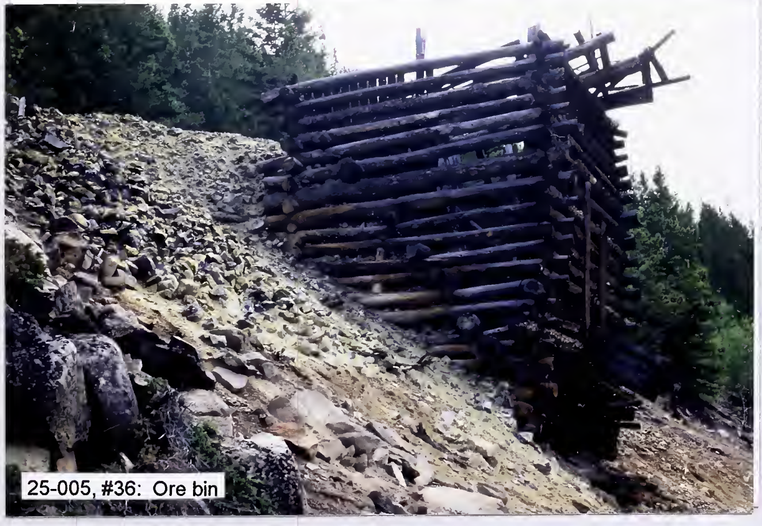
25-005, #33: WR-1 from top



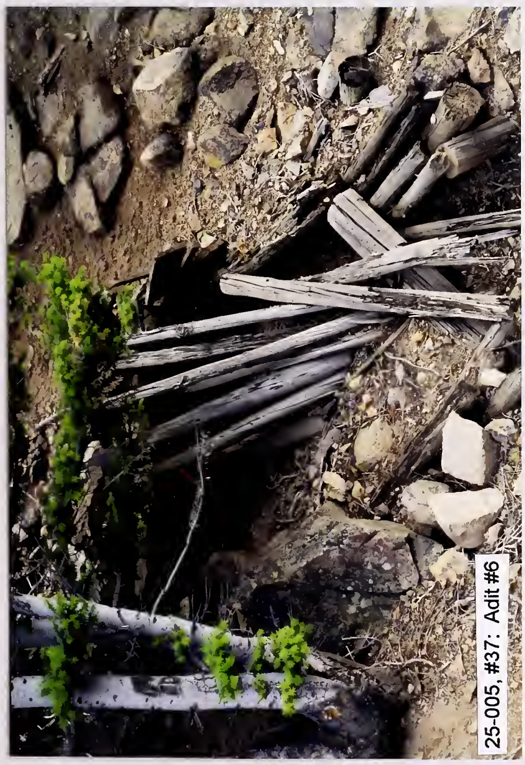
25-005, #34: WR-1 from top



25-005, #35: Adit #1 discharge



25-005, #36: Ore bin



25-005, #37: Adit #6

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: RED WATER **PA#:** 25-007

Date: July 13, 1993 **Time:** 1120

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool, 50°F; cloudy; slight breeze; wet spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #21: SW-1 location looking southeast toward site; #22: Adit discharge coming off of hill down to Tenmile Creek; #23: SW-2 location looking northwest; #24: Adit discharge, GW-1 sample location; #25: Adit discharge across dump; #26: WR-1, borrow area; #27: Residence 400 feet west of WR-1, GW-2 sample location. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): Approximately 2,000 cubic yards have been borrowed from WR-1 and apparently spread out to make a level area for the nearby residence. This flat area was sampled as WR-2. Mine dump is approx. 200 yds upgradient of Helena's Tenmile drinking water intake.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Pull waste rock away from creek, amend, topsoil, and vegetate. Study water treatment alternatives. Close HMO.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): RED WATER PA#: 25-007

Legal Description: T 8N ;R 5W ;Sec. 4 , NW1/4 ___ 1/4 ___ 1/4

County: LEWIS AND CLARK Mining District: RIMINI

Latitude: N 46° 28' 30" Longitude: W 112° 14' 42"

Primary Drainage Basin and Code: Tenmile Creek/10030101
Secondary Drainage Basin: Tenmile Creek

USGS Quadrangle map name(s): Chessman Reservoir

Mine Type/Commodities: Hardrock/Gold, Silver, Lead

Activity Status: Active ___, Inactive/Exploration ___, Abandoned X .

Ownership status: Known Y X N ___; private/public? Private/Public
Owner, Agent, or Contact (Include address and phone when available): Mitchell Lovely, 1635 Mill Road, Helena, MT 59601; Emmett Sullivan, 890 Granite Avenue, Helena, MT 59601; Dale Armstrong, P.O. Box 325, Helena, MT 59624; Charles Hundley, 1995 Orofino Gulch, Helena, MT 59601; Bruce Toomey, Box 3065, Paso Robles, CA 93447; Vivian Harding, 1422 Wilder, Helena, MT 59601; Helena National Forest.

Relationship to other mines/sites in the area/district: Red Mountain, Valley Forge, and the Upper Valley Forge mines are of same type.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5400', Slope 50%, Aspect West

Land use: Mining X , Recreational ___, Residential X , Urban ___, Agricultural ___, Other(Specify) ___

Area of disturbed/unvegetated lands? Approx. 3 acres.
Dimensions: ___

Predominant vegetation types: Lodgepole pine in surrounding area.

Access: roads - good X , poor ___, 4wd ___, trail ___.
Other logistical considerations (proximity to other sites). Up Tenmile Creek Road from Valley Forge and down the road 3/4 mile from the Tenmile Mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 14 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Red Water Mine lies on the east side of Ten Mile Creek as it flows north. Water from the mine enters the creek about 200 yards above the Helena water supply intake. The predominant rock type in the area is the quartz monzonite of the Boulder Batholith.

Mining/milling history, ore type/tenor, host rock, gangue: Mining began in the area in the 1860's; the Red Water mine is not mentioned in literature in 1911. The ore body is most likely an auriferous silver-lead deposit enclosed in granite. Principle ore minerals are galena, with sphalerite and pyrite, with subordinate arsenopyrite and tetrahedrite. Gangue appears to be quartz-tourmaline (black quartz) rock.

Mine Operation?
Shafts - Yes___, No_X_, # ____, Comment
Adits - Yes_X_, No___, # _1_, Comment Open
Pits - Yes___, No_X_, # ____, Comment
Placers - Yes___, No_X_, # ____, Comment
Other - Yes___, No_X_, # ____, Comment

Mill Operation? Yes____, No_X_. If yes answer the next three questions:

Period(s) of Operation: N/A

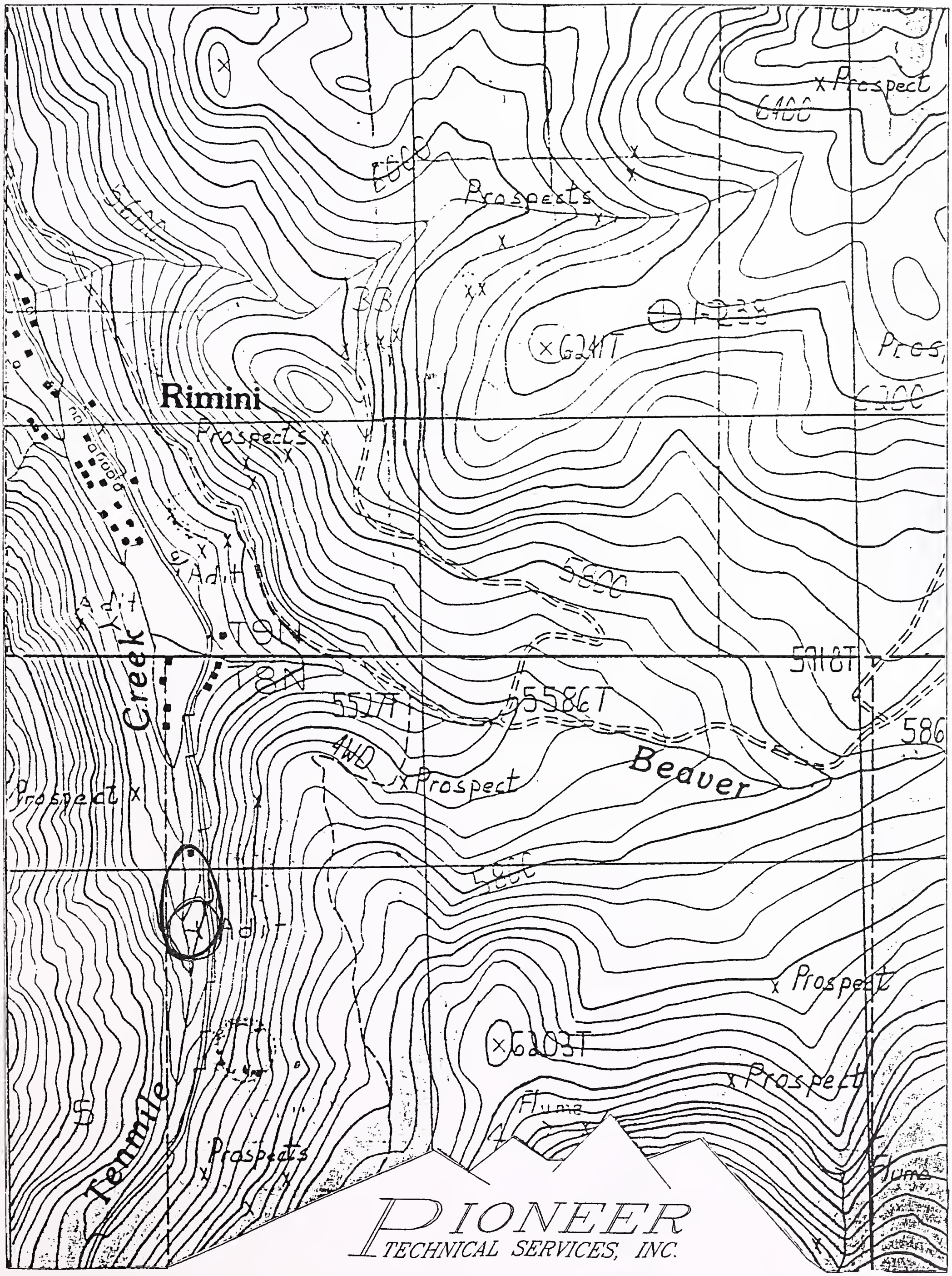
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

10/29/1993

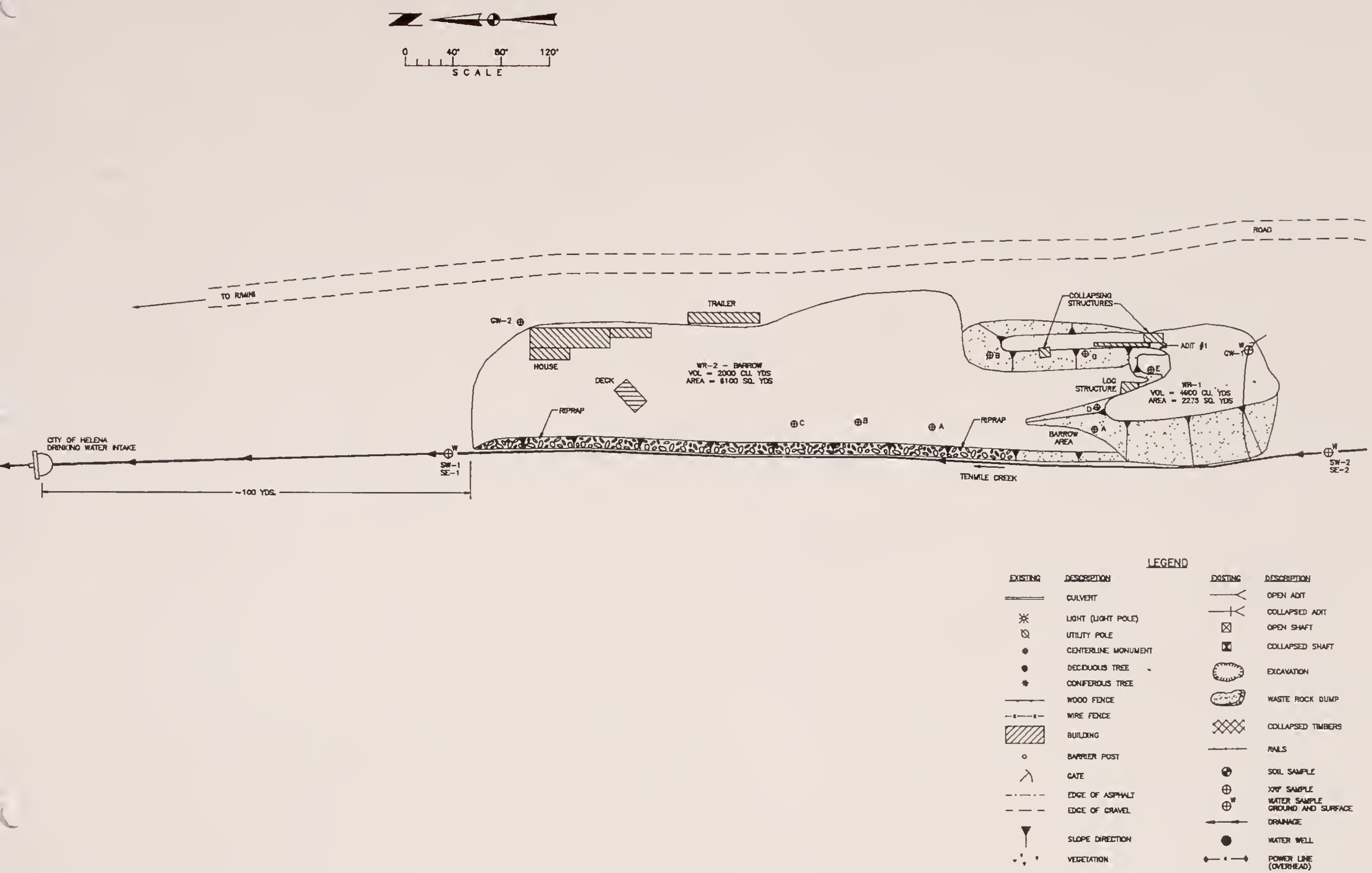
ll No.	Location	Depth	Yield	Static Water Level
M:123817	08N 05W 04 BA	120.0	30.0	35.00
M:59174	09N 05W 32	62.0	30.0	7.00
M:59175	09N 05W 32 CC	25.0	20.0	0.00
M:59176	09N 05W 32 DAA	29.0	24.0	16.00
M:59177	09N 05W 33	63.0	0.0	10.00
M:131277	09N 05W 33	100.0	12.0	39.00
M:59178	09N 05W 33	35.0	30.0	0.00
M:59180	09N 05W 33	26.0	15.0	6.00
M:59179	09N 05W 33	44.0	20.0	10.00
M:59181	09N 05W 33 CB	80.0	20.0	15.00
M:123830	09N 05W 33 CC	160.0	15.0	25.00
M:123829	09N 05W 33 CC	60.0	20.0	20.00
M:59182	09N 05W 33 CDCC	29.0	12.0	18.00
M:131268	09N 05W 34	55.0	3.5	15.50
M:59183	09N 05W 34 AA	145.0	8.0	20.00



PIONEER
TECHNICAL SERVICES, INC.

RED WATER, P.A. NO. 25-007

T08N, R05W, SECTION 04
SCALE: 1" = 1000'



DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

RED WATER PA# 25-007
RIMINI DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-007.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	4,900	On western lobe in the borrow area	None	6.0 (D)	0.05	25-007-WR-1	07/13/93 1545	T-Metals, ABA
WR-1B	WR		On eastern lobe of WR-1 on west side	None	3.8 (D)	0.06			
WR-1C	WR		On eastern lobe, south side	None	5.5 (D)	0.055			
WR-1D	WR		On western lobe on east side	None	5.5 (D)	0.07			
WR-1E	WR		On small center lobe of WR-1	None	4.8 (D)	0.065			
WR-2A	WR	2,000	Southern most hole 141' from southwest corner of WR-1	None	6.1 (D)	0.07	25-007-WR-2	07/13/93 1526	T-Metals, ABA
WR-2B	WR		213' from southwest corner of WR-1	None	6.4 (D)	0.07			
WR-2C	WR		282' from southwest corner of WR-1	None	6.3 (D)	0.05			
WR-1 UK	CONC	20	Black sandy loam on top of loadout	None	6.8 (D)	0.05	N/A		
SS-1	BKGRND	N/A	Background soil 1/2 mile up the road, 300' up between Red Water and Tenmile Mines	N/A	6.35 (D)	0.025	25-008-SS-1	07/13/93 1650	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-007-WR-1 is composite of WR-1A through -1E. 25-007-WR-2 is composite of WR-2A through -2C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 259

Distance to nearest well used for drinking? 400' downgradient of site

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Large amount of FEOX precipitate from the drainage.

Other observations/notes: Domestic well at residence 400' downgradient of site was drilled in a small pile of waste rock. Well drilled by H&L Drilling from Townsend (266-3035). Probable well log indicates total depth as 120', static water level as 35', and yield as 30 gpm.

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Mouth of Adit #1	0.064 cfs (M)	6.79	203	65	9.6	58	N/A	25-007-GW-1	07/13/93 1300	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	RW	Residential well 400' downgradient from site	10 gpm (E)*	7.62	216	115	9.0	58	Unknown	25-007-GW-2	07/13/93 1500	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-3	RW	QA/QC duplicate	10 gpm (E)*	7.62	216	115	9.0	92	Unknown	25-007-GW-3	07/13/93 1515	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): 50 gallons were purged from the well before sampling. *The flow rate for GW-2 and GW-3 was the approximate purge rate.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Tenmile Creek

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes X, No ___, Name(s)/Description: Adit discharge flows over WR-1 prior to discharge to Tenmile Creek.

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-1 and WR-2

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 26 during investigation
High Flow: 300 cfs, Average Flow: 17 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; base of WR-1 is in Tenmile Creek.

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: No runon controls water draining downslopes crosses waste dump; water flowing from Adit #1 flows across WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Drinking water supply, Helena intake is 200 yds downgradient of site; irrigation, residential use, wetlands, picnic areas, campgrounds.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 20 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Discoloration of rocks approx. 20 feet downstream of confluence with adit discharge.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downgradient of site just across from house and shed	6.88	74	133	7.8	10	26 cfs (M)	25-007-SW-1	07/13/93 1200	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downgradient of site just across from house and shed	N/A	N/A	N/A	N/A	N/A	N/A	25-007-SE-1	07/13/93 1200	T-Metals
SW-2	SW	Approx. 25′ upgradient of southeast end of WR-1	7.11	73	150	7.8	18	26 cfs (M)	25-007-SW-2	07/13/93 1230	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Approx. 25′ upgradient of southeast end of WR-1	N/A	N/A	N/A	N/A	N/A	N/A	25-007-SE-2	07/13/93 1230	T-Metals
SW-3	SW	Adit discharge just before confluence with Tenmile Creek	6.67	215	NM	13.5	NM	N/A	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Broad level area (WR-2) approx. 0.8 acres in size between WR-1 and residence that could potentially be used for treatment of adit discharge

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300 X ; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 400 feet (north edge of the site)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	**ACID MINE DRAINAGE CHARACTERISTICS** (LIST)	**MOISTURE CONTENT** (WET/DRY/PARTIAL)	**SURFACE AREA** (SQUARE FEET)	**UNCOVERED/UNVEGETATED AREA** (SQUARE FEET)	**AVAILABLE FINES** (YES/NO)	**DUST PROPAGATION POTENTIAL** (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; pH	Partial	20,475	19,450	Yes	Low
WR-2	SO3	Dry	54,900	46,665	Yes	Low
Adit #1	SPG; FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes X , No ___,
Describe: Resident within 400 feet of WR-1 is in contact with WR-2.

Population within 1 mile: 1-10___; 10-30___; 30-100 X ; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments ___

Evidence of recreational use on site: Yes X , No___, Describe: Use of area by residents

Accessibility - Fences, warning signs, closed roads? Access is gained by walking either through residence yard or by walking along the bank of Tenmile Creek.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment___
Wilderness Area - Yes___, No X , Comment___
T&E Species Habitat - Yes X , No___, Comment Peregrine Falcon
Bat Habitat - Yes X , No___, Comment Adit

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium___, Low X
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations: Adit is open.

Hazardous structures: Yes X , No___, Number 1 , types and locations: Old loadout

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 1 , types and locations: WR-1 where barrow material was taken

Unstable waste piles, impoundments, undercut banks: Yes X , No___, Number 1 , types and locations: WR-1 is along river and has very steep, eroding banks.

Fire and/or Explosion hazards: Yes___, No X , Explain:___

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Red Water Mine, Prepared by Tierra Buena Consulting, December 20, 1982.

MDSL/AMRB Files, Problem Area Data Form for Red Water, Prepared by Mark Carlstrom and Ben Mundie, November 15, 1979.

USGS, Ore Deposits of the Helena Mining Region, Montana, Bulletin 527, Author Unknown, Date Unknown.

USGS, Topographic Map, Chessman Reservoir, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

RED WATER
PA NO. 25-007

Red Water PA# 25−007
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 07/13/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−007−SE−1	350 J	43.6	5	6.4	3.6 J	31.3 J	9230	0.141	895	6 J	254 J	7 UJ	441	NR
25−007−SE−2	167 J	21.6	2.6	4.8	1.3 U	11.1 J	5390	0.079	478	3 J	54 J	6 UJ	205	NR
25−007−WR−1	8260 J	16	5.5	3.3	1.2 U	96 J	17200	0.327	669	4 J	2140 J	43 J	678	NR
25−007−WR−2	4010 J	36.6	3.5	4.4	1.2 J	79.6 J	22400	0.499	661	4 J	2290 J	17 J	463	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25−007−WR−1	0.95	29.7	9.27	−20.	0.45	0.17	0.33	5.31	3.96
25−007−WR−2	0.57	17.8	2.2	−15.	0.33	0.05	0.19	1.56	0.64

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25−007−GW−1	131	41.00	73.90	13.80	6.83 U	16.00	6160	0.038 U	6250 J	12.7 U	1.02 J	33.1	14100 J	190
25−007−GW−2	14.3	46.90	2.57 U	9.70 U	6.83 U	49.30	11.8 U	0.073	15 J	12.7 U	0.72 U	30.7 U	11 J	97
25−007−GW−3	12.62 J	39.80	2.57 U	9.70 U	6.83 U	49.40	20.8 JX	0.038 U	23.7	12.7 U	3.71	30.7 U	20.1 J	98.8
25−007−SW−1	3.89 J	11.40	2.57 U	9.70 U	6.83 U	11.80	321 JX	0.160	64.4	12.7 U	6.3	30.7 U	201 J	16.2
25−007−SW−2	3.95 J	11.00	2.90 J	9.70 U	6.83 U	11.30	242 JX	0.160	48.5	12.7 U	3.4	30.7 U	157 J	15.7

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
25−007−GW−1	315	< 5.0	199	< 0.05	NR
25−007−GW−2	199	< 5.0	50	< 0.05	NR
25−007−GW−3	188	< 5.0	50	< 0.05	NR
25−007−SW−1	69	< 5.0	7	< 0.05	NR
25−007−SW−2	60	< 5.0	7	< 0.05	NR

LEGEND

SE1 − Downgradient of site, just across from house and shed.
SE2 − Approx. 25' upgradient of SE end of waste rock dump 1.
WR1 − Composite of subsamples WR1A through 1E.
WR2 − Composite of subsamples WR2A, 2B, and 2C.
BACKGROUND − From the Red Water Mine (25−007−SS−1).

GW1 − Discharge from the mouth of adit #1.
GW2 − Residential well, 400' downgradient from site.
GW3 − QA/QC duplicate of 25−007−GW−2.
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.

XRF ANALYSIS RESULTS

RED WATER
PA NO. 25-007

Mine Name: Red Water PA# 25–007
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25–007–WR1–A		32695.9	9251.18	1811.75		5633.55	28943.8		66.3589 *	1093.97	1104.07	215.224
25–007–WR1–B		17061.8	1314.42	532.385		303.737 *	50201.4		151.102 *	444.76	48504.6	47.6093
25–007–WR1–C		20194.2	6092.02	1154.08	208.377 *	1272.74	19542		42.2885 *	403.677	306.557	387.188
25–007–WR1–D		20467	3165.78	2767.58		1439.26	41332.6		76.3955 *	921.349	1253.35	182.549
25–007–WR1–E		32627.2	1892.56	1675.26		295.064 *	23039		198.349	621.604	4206.89	99.763
25–007–WR1–E–DUP		27837.3	1907.48	1475.12			21971.6		236.928	543.124	4140.38	108.003
25–007–WR1–UNK		5758.25	5135.16	298.17 *	213.025 *	138322	33979.6		1813.31	82456.2	4904.5	332.484
25–007–WR2–A		22378.4	3421.88	1367.79	257.286 *	289.555 *	32955.7		109.732 *	274.188	8044.93	191.869
25–007–WR2–B		25010.8	6241.39	1870.49		1914.81	43002.1		157.575 *	635.023	5517.62	270.324
25–007–WR2–C		26133.3	6718.94	1688.71	242.731 *	2124.28	30494.5		82.7158 *	486.562	1986.92	279.132
25–007–WR–1–COMP		23643.5	2922.54	1647.55		770.485 *	36415.1		117.595 *	590.146	13969.4	129.1
25–007–WR–2–COMP		25333.7	4931.86	1490.31	159.602 *	1022.07 *	34224.2		79.3194 *	427.633	5326.73	249.208

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25–007–WR1–A	151.907			350.233	238.162			459.271		13.6177 *	15.6929 *
25–007–WR1–B	63.9588			2131.24	184.663		133.121 *	80.1838 *			8.37093 *
25–007–WR1–C	104.916			32.0915 *	174.214			869.16			15.3838 *
25–007–WR1–D	173.124			2208.49	212.183		56.7453 *	435.532			23.8992 *
25–007–WR1–E	153.107			5596.85	245.694		308.484	299.81	135.735 *		22.8003 *
25–007–WR1–E–DUP	156.648			5277.79	226.963		309.824	282.062			27.859 *
25–007–WR1–UNK	63.5543		14.6063 *	2221.67	119.889	620.245 *		630.343	166.897 *	20.4195 *	15.3046 *
25–007–WR2–A	162.176			3343.72	210.062		86.0723 *	343.457			19.4596 *
25–007–WR2–B	148.886			2710.84	196.038	185.913 *		490.14		11.7681 *	24.848 *
25–007–WR2–C	115.841			1043.8	216.03		51.288 *	518.67		13.0589 *	13.8633 *
25–007–WR–1–COMP	126.651			2731.38	223.891		139.101 *	313.212			23.2926 *
25–007–WR–2–COMP	142.368			2564.57	191.172		70.1758 *	410.695		12.588 *	19.4434 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

RED WATER
PA NO. 25-007

AIMSS SCORESHEET

SITE NAME: RED WATER
PA NUMBER: 25-007

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	44.911
6	GW - TARGETS	WELLS - 1 MI. x 2.5		35.0
7		WELLS - 1 TO 4 MI		245
8		NEAREST WELL		10
9		TARGETS SCORE	LINES 6 + 7 + 8	290.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	5209676

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	46.569
16	SW - TARGETS	DRINKING WATER POP'N		2450
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	2473
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	80615596

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.673
29	AIR - TARGETS	POPULATION - 4 MILES		100
30		NEAREST RESIDENCE		10
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	115
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	38479

DIRECT CONTACT PATHWAY

LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		250
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	400
38		LIKELIHOOD SCORE	LINES 36 + 37C	650
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.629
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	50
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	52943

LINE NO.		
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**859.17**

SITE NAME: RED WATER
PA NUMBER: 25-007

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	165
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	50
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**165.00**

25-007, #21: SW-1 and SE-1 sample locations

25-007, #22: Adit discharge coming off hill into Tenmile Creek

25-007, #23: SW-2 and SE-2 sample locations, facing northwest

25-007, #24: Adit discharge; GW-1 sample location

25-007, #25: Adit discharge across dump

25-007, #26: WR-1

25-007, #27: Residence 400' west of WR-1; GW-2 and GW-3 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: VALLEY FORGE/SUSIE **PA#:** 25-008

Date: July 13, 1993 **Time:** 0845

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: Roger K. Siewart, Resident
Kathryn Bonits, owns adjacent land

Weather/Seasonality Observations: Cloudy; cold (48°F); slight breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #15: SW-2 and SE-2 sample location; #17: SW-1 sample location; #18: WR-2; #19: GW-2 sample location; #20: GW-1 sample location and WR-1 (reclaimed). Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** WR-1 has been reclaimed; slope has been covered with jute netting and then revegetated. One place near the top of the dump is barren; jute netting is ripped in the area. Perforated PVC pipe was installed at toe of WR-1 for seep that was reported in the 1982 investigation. A fence runs along the front of the reclaimed area. Dump on the SSW side of the road (WR-2) has been flattened out and large boulders placed along the west side. The residence to the south has waste rock underlying their yard area and the bank of Tenmile Creek.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove waste rock from floodplain; study water treatment alternatives.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): VALLEY FORGE/SUSIE **PA#:** 25-008

Legal Description: T 9N **;R** 5W **;Sec.** 33 **,** NW**1/4** S **1/2**___**1/4**

County: LEWIS & CLARK **Mining District:** RIMINI

Latitude: N 46° 29' 40" **Longitude:** W 112° 14' 04"

Primary Drainage Basin and Code: Tenmile Creek/10030101
Secondary Drainage Basin: Tenmile Creek

USGS Quadrangle map name(s): Chessman Reservoir

Mine Type/Commodities: Hardrock/Gold, Silver, Lead
Activity Status: Active___**, Inactive/Exploration**___**, Abandoned** X .

Ownership status: Known YX **N**__**; private/public?** Private/Public
Owner, Agent, or Contact (Include address and phone when available)**:** Charles Goddard, 452 Three Mile Creek Road, Stevensville, MT 59870; Philip E. Maynard, Century Silver Mines, Inc., 3494 Rimini Avenue, Helena, MT 59601; Ronald A. Calahan, Box 9111, Helena, MT 59604; Helena National Forest.

Relationship to other mines/sites in the area/district: May be connected underground with the Upper Valley Forge Mine (25-280 and 25-282).

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Reclamation by AMRB, subcontracted to Peccia, WR-1 and associated seep.

General site features: Elevation 5240' **, Slope** 0°-28° **,**
Aspect Southwest

Land use: Mining___**, Recreational**___**, Residential** X **, Urban**___**,**
Agricultural___**, Other(Specify)**

Area of disturbed/unvegetated lands? 0.5 **acres.**
Dimensions: Unvegetated portion WR-2 (126'x76'); approx. 0.25 acre of impacted soils in acid seep area.

Predominant vegetation types: Grasses on reclaimed dump and pioneering on WR-1; lodgepole pine on slopes surrounding WR-2.

Access: roads - good X **, poor**___**, 4wd**___**, trail**___**.**
Other logistical considerations (proximity to other sites). Downstream from Red Water mine approx. 1/2 mile; site is right in town of Rimini.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 17 wells within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on east side of Tenmile Creek which flows northwest through the site. The base of WR-1 sits in the creek. Underlying rock for the area is the quartz monzonite of the Boulder Batholith.

Mining/milling history, ore type/tenor, host rock, gangue: Host rock is quartz monzonite, sericetized at contact and impregnated with pyrite, galena, sphalerite, and arsenopyrite. The gangue rock is quartz tourmaline. Ore is an aggregate of galena, pyrite, sphalerite, and rarely chalcopyrite. Mine was first operated in 1870's and was operated again from 1907-1925; several thousand tons of ore was estimated to be shipped. In 1946-47, dump material was processed. Valley Forge was largest producer in the valley in 1911.

Mine Operation?
Shafts - Yes___, No X , # ___, Comment
Adits - Yes X , No___, # 1 , Comment Caved or backfilled
Pits - Yes___, No X , # ___, Comment
Placers - Yes___, No X , # ___, Comment
Other - Yes___, No X , # ___, Comment

Mill Operation? Yes___, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

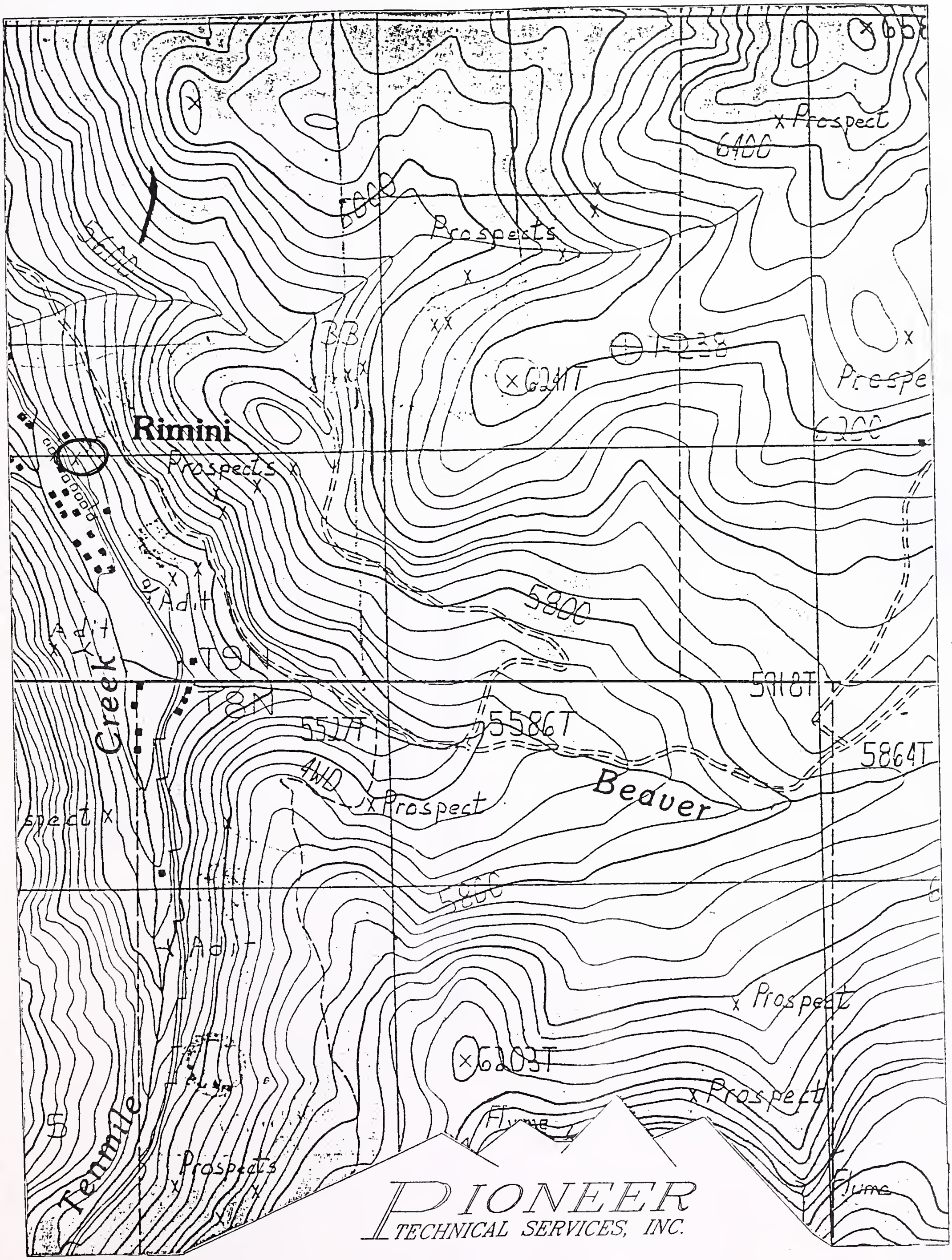
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

10/29/1993

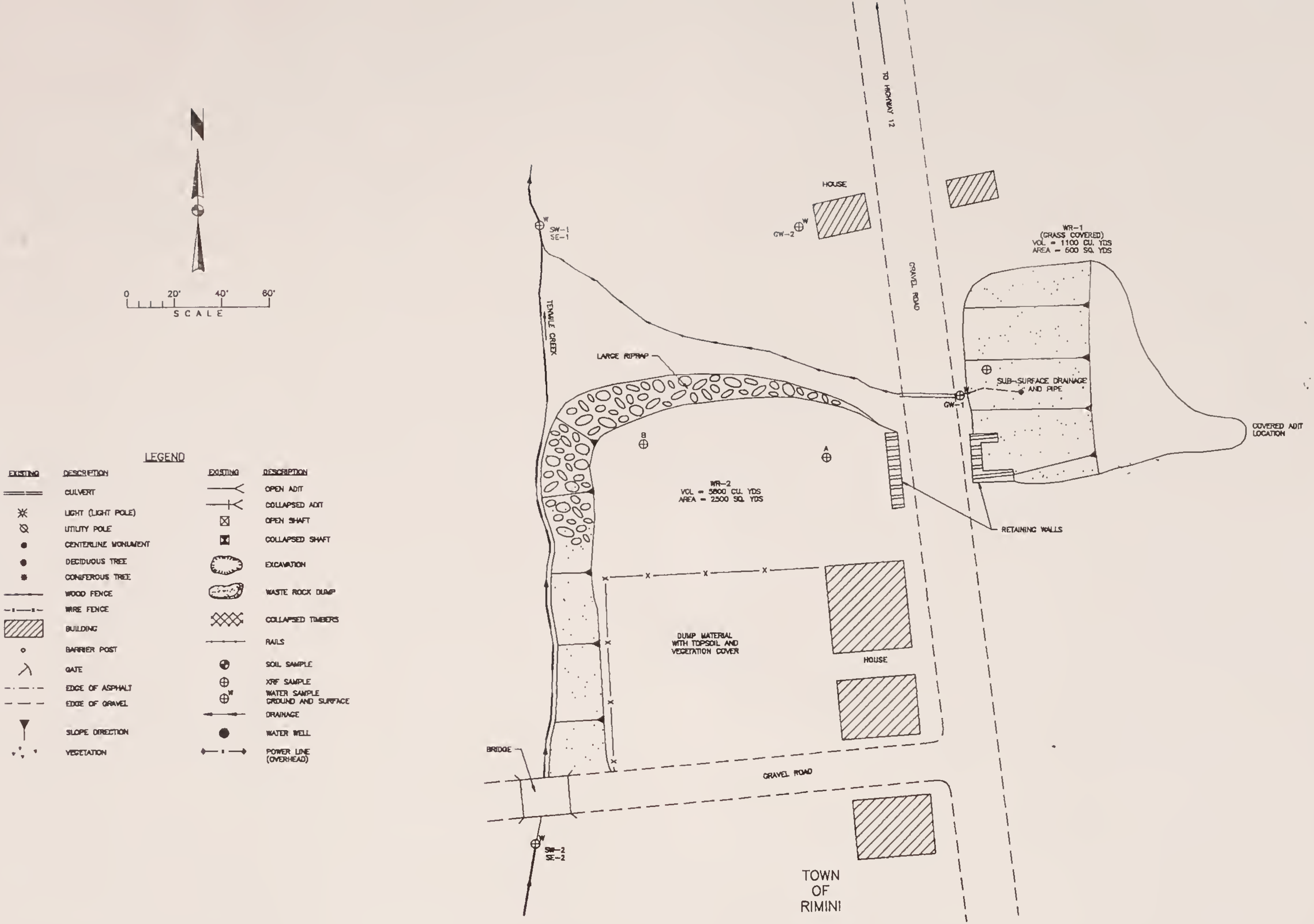
ell No.	Location	Depth	Yield	Static Water Level
M:123817	08N 05W 04 BA	120.0	30.0	35.00
M:59172	09N 05W 29	208.0	3.0	40.00
M:59173	09N 05W 29 DD	278.0	20.0	166.00
M:59174	09N 05W 32	62.0	30.0	7.00
M:59175	09N 05W 32 CC	25.0	20.0	0.00
M:59176	09N 05W 32 DAA	29.0	24.0	16.00
M:59177	09N 05W 33	63.0	0.0	10.00
M:131277	09N 05W 33	100.0	12.0	39.00
M:59178	09N 05W 33	35.0	30.0	0.00
M:59180	09N 05W 33	26.0	15.0	6.00
M:59179	09N 05W 33	44.0	20.0	10.00
M:59181	09N 05W 33 CB	80.0	20.0	15.00
M:123830	09N 05W 33 CC	160.0	15.0	25.00
M:123829	09N 05W 33 CC	60.0	20.0	20.00
M:59182	09N 05W 33 CDCC	29.0	12.0	18.00
M:131268	09N 05W 34	55.0	3.5	15.50
M:59183	09N 05W 34 AA	145.0	8.0	20.00



PIONEER
TECHNICAL SERVICES, INC.

VALLEY FORGE, P.A. NO. 25-008

T09N, R05W, SECTION 33
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

VALLEY FORGE PA# 25-008
RIMINI DISTRICT LEWIS AND CLARK COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TDH
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

25-008.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	1,100	On north-northeast side of road in unvegetated area	None	6.0 (D)	0.06	N/A	N/A	
WR-2A	WR	5,800	Near west side of road	None	6.0 (D)	0.04	25-008-WR-1	07/13/93 1450	T-Metals, ABA
WR-2B	WR		West side of road closer to creek	None	5.9 (D)	0.055			

* D-Direct reading(Kalwey Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-008-WR-1 is composite of WR-2A and -2B. Volume for WR-2 include an estimate of mine wastes underlying residential yards.
Background sample for this site is 25-007-SS-1 from the Red Water Mine.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes X , No___, Number: 1 Identification: GW-1; mine discharge water collected in subsurface pipe.

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 259

Distance to nearest well used for drinking? 100' downgradient; 50' upgradient

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Low pH in water seeping from below dump; high metal content in WR-1.

Other observations/notes: Water was flowing from seep at toe of WR-1 during reclamation activities; a perforated PVC was installed in the vicinity of a defuse spring to concentrate the flow and reduce the zone of impact. AMRB should evaluate potential for and impacts of pipe plugging and slope failure similar to what happened at the Tenmile Mine.

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	Seep	Mouth of pipe at base of WR-1	20 gpm (E)	5.70	379	91	9.7	46	N/A	25-008-GW-1	07/13/93 0900	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	RW	Residential well 100' north (downgradient)	N/A	5.31	255	204	7.2	0	15	25-008-GW-2	07/13/93 1015	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Residential well is 65' deep and 6" in diameter. Sample was taken from outside tap after it had run for 45 minutes; purge volume was 450 gallons. Required minimum purge volume was 220 gallons.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Tenmile Creek flows along base of WR-2. Seep water flows across WR-2 discharging directly into Tenmile Creek.

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-2

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 22 cfs during investigation
High Flow: 300 cfs, Average Flow: 17 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; Tenmile flows along base of WR-2 and water from seep flows across WR-2.

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Tenmile flows along base of WR-2 and water from seep flows across WR-2.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, wetlands, agriculture, residential, fishery, T&E - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 30' Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Discoloration of rocks occurs along entire length that the seep flows. Some discoloration of rocks and turbidity occurs on east side of Tenmile Creek after seep confluence, approx. 25-30 feet.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	About 25' below confluence with seep in Tenmile Creek	6.72	93.6	10	6.8	8	22.1 cfs (M)	25-008-SW-1	07/13/93 0930	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	About 25' below confluence with seep in Tenmile Creek	N/A	N/A	N/A	N/A	N/A	N/A	25-008-SE-1	07/13/93 0930	T-Metals
SW-2	SW	Upstream of bridge on Tenmile Creek, approx. 25' upstream of end of WR-2	7.01	83.3	225	6.9	12	22 cfs (E)	25-008-SW-2	07/13/93 0945	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upstream of bridge on Tenmile Creek, approx. 25' upstream of end of WR-2	N/A	N/A	N/A	N/A	N/A	N/A	25-008-SE-2	07/13/93 0945	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
$pH \leq 5.0$	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 1 acre of WR-2 land and adjacent land stream is on

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300 X ; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? One residence approx. 50' south, one residence 100' north, and one residence 150' northeast

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3	Dry	4,500	225	No	None
WR-2	SO3	Dry	22,500	5,600	Yes	Low
GW-1	SPG; FEOX; pH	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: WR-2 area includes estimate of area under the residential yards.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____, Describe: One house downgradient approx. 100', one downgradient across road 100', and one house upgradient approx. 50'

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments______________________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Site lies between two houses.

Accessibility - Fences, warning signs, closed roads? No restrictions are present on WR-2; WR-1 is partially fenced.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________________
Wilderness Area - Yes___, No_X_, Comment____________________
T&E Species Habitat - Yes_X_, No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No_X_, Comment____________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______________________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_1_, types and locations: Portion of WR-2 along bank that is covered mostly by residential lawns is being actively eroded into Tenmile Creek.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

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LABORATORY ANALYTICAL DATA

VALLEY FORGE
PA NO. 25-008

Valley Forge/ Susie PA# 25−008
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 07/13/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−008−SE−1	212 J	42.5	5.3	7.6	6.3 J	28.1 J	13900	0.024	1040	6 J	181 J	9 UJ	301	NR
25−008−SE−2	151 J	18.8	2.6	5	3.2 J	14.1 J	5480	0.036	619	3 J	158 J	6 UJ	220	NR
25−008−WR−1	21500 J	103	5.1	5.2	2.8 J	167 J	35000	0.886	711	6 J	9870 J	71 J	757	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25−008−WR−1	1.04	32.5	96.2	63.7	0.26	0.2	0.58	6.25	90

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25−008−GW−1	27700 J	2.01 U	91.80 J	64.90	10.20	33.80	171000 JX	0.150	14500	43.6	13.2	53.6	27200 J	921
25−008−GW−2	6.72 J	54.00	2.57 U	9.70 U	6.83 U	11.00	491 JX	0.038 U	31.4	12.7 U	8.98	30.7 U	20.9 J	250
25−008−SW−1	40.74 J	10.00	5.17 J	9.70 U	6.83 U	12.60	425 JX	0.140	79.5	12.7 U	4.87	30.7 U	277 J	17.9
25−008−SW−2	5.61 J	10.60	4.30 J	9.70 U	6.83 U	12.70	233 JX	0.120	64.4	12.7 U	4.55	30.7 U	248 J	17.7

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
25−008−GW−1	2010	< 5.0	1170	< 0.05	NR
25−008−GW−2	1020	< 5.0	575	1.4	NR
25−008−SW−1	64	< 5.0	11	< 0.05	NR
25−008−SW−2	76	< 5.0	11	< 0.05	NR

LEGEND

SE1 – About 25' below confluence with seep in Tenmile Creek.
SE2 – Upstream of bridge on Tenmile Creek; 25' upstream of waste rock dump 2.
WR1 – Composite of subsamples WR 2A and 2B.
BACKGROUND – From Red Water Mine (25−007−SS−1).
GW1 – From mouth of pipe at base of waste rock dump 1.
GW2 – Residential well; 100' North (downgradient).
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

VALLEY FORGE
PA NO. 25-008

Mine Name: Valley Forge/Susie PA# 25–008
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25–008–WR1–A		19927.9	57283.8	3065.11	183.435 *	1562.47	29532.6		62.8188 *	124.161 *	50.845 *	442.74
25–008–WR2–A		20248.7	16752.7	2015.4	191.661 *	1718.59	40802.5		201.515	3554.98	5895.06	216.496
25–008–WR2–B		15078	2724.08	902.684		1063.91 *	74531.5		344.583	1840.74	45586.8	152.032
25–008–WR–1–COMP		19240.5	36105.8	1847.19		1166.9 *	50599.2		187.332 *	852.853	22672.2	310.455

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25–008–WR1–A	183.286			83.1101	155.203			617.516			16.8271 *
25–008–WR2–A	141.848			4021.44	167.212			373.288		12.7081 *	24.8418 *
25–008–WR2–B	107.325			16620.2	162.515	273.114 *	268.375 *	258.73			
25–008–WR–1–COMP	145.339			7283.52	153.731		171.65 *	511.328			16.9345 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

VALLEY FORGE/SUSIE
PA NO. 25-008

AIMSS SCORESHEET

SITE NAME: VALLEY FORGE/SUSIE
PA NUMBER: 25-008

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	93.624
6		WELLS - 1 MI. x 2.5		42.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		242
8		NEAREST WELL		10
9		TARGETS SCORE	LINES 6 + 7 + 8	294.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	11028907
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	96.672
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1556419
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.322
29		POPULATION - 4 MILES		100
30		NEAREST RESIDENCE		10
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	115
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	7406
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		250
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	400
38		LIKELIHOOD SCORE	LINES 36 + 37C	650
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.312
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	50
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	10140
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**126.03**

SITE NAME: VALLEY FORGE/SUSIE
PA NUMBER: 25-008

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	0
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	50
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

```
STATE HEALTH DEPT.        WATER QUALITY BUREAU          HELENA, MONTANA  59601

           STATE  MONTANA                                 COUNTY  LEWIS+CLARK
      LAT.-LONG.  462918N 1121445W               SAMPLE LOCATION   9N  5W 33CCA
    STATION CODE                                 ANALYSIS NUMBER  77W0472
    DATE SAMPLED  04-06-77                        DRAINAGE BASIN  0411 -U MISSOURI
    TIME SAMPLED  1330                           WATER FLOW RATE       7.0 GPM(M)
  METHOD SAMPLED  GRAB                   FLOW MEASUREMENT METHOD  BUCKET+ TIME
   SAMPLE SOURCE  MINE DRAIN             ALTITUDE OF LAND SURFACE
       WATER USE  UNUSED                 TOTAL WELL DEPTH BELOW LS
      AQUIFER(S)                          SWL ABOVE(+) OR BELOW LS
      SAMPLED BY  WQBH                  SAMPLE DEPTH BELOW SURFACE

          SAMPLING SITE: VALLEY FORGE MINE SEEP IN RIMINI

                     MG/L      MEQ/L                               MG/L      MEQ/L
   CALCIUM (CA)      247.      12.340   BICARBONATE(HCO3)
 MAGNESIUM (MG)      120.       9.841     CARBONATE (CO3)
    SODIUM (NA)      37.0       1.609     CHLORIDE   (CL)       2.9      0.082
 POTASSIUM  (K)                             SULFATE (SO4)      600.     12.492
      IRON (FE)                            FLUORIDE   (F)
 MANGANESE (MN)                         PHOSPHATE(PO4 AS P)
  ALUMINUM (AL)                           NO3+NO2(TOT AS N)

                   -------    -------                         -------    -------
   SUM CATIONS     403.921    23.790            SUM ANIONS    602.900    12.574

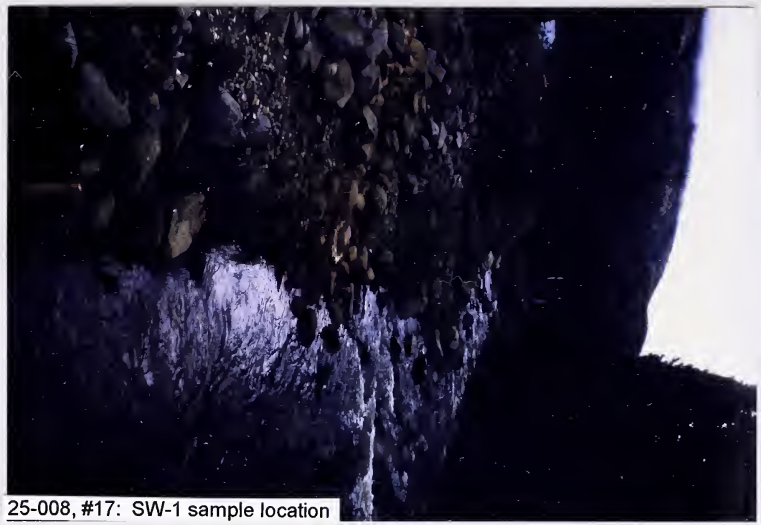
             LABORATORY PH        4.40      TOT HARDNESS(MG/L-CACO3)   1110
 FIELD WATER TEMPERATURE (C)               TOT ALKALINITY(MG/L-CACO3)
  SUM-DISS. IONS MEAS.(MG/L)               LABORATORY TURBIDITY (JTU)
  LAB CONDUCTIVITY-UMHOS-25C  2201.0         SODIUM ADSORPTION RATIO      0.5

                  A D D I T I O N A L   P A R A M E T E R S
  ACIDITY,TOT (MG/L-CACO3)    505.          ZINC,TR (MG/L AS ZN)     47.
      IRON,TR (MG/L AS FE)    153.        COPPER,TR (MG/L AS CU)     561
  CADMIUM, TR (MG/L AS CD)      .497    MANGANESE,TR(MG/L AS MN)     1.6
   ARSENIC,TR (MG/L AS AS)    4.0

REMARKS: TEN MILE CREEK            ORANGE COLOUR PRECIPITATE PRESENT

EXPLANATION: MG/L=MILLIGRAMS PER LITER  MEQ/L=MILLIEQUIVILENTS PER LITER
ALL CONSTITUENTS DISSOLVED (DISS) EXCEPT AS NOTED. TOT=TOTAL SUSP=SUSPENDED
(M)= MEASURED(R)=REPORTED (E)=ESTIMATED M=METERS TR=TOTAL RECOVERABLE
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
SAMPLE NO 03        SAMPLER   DP     HANDLING 2100    ANALYST  KK     LAB  WQBH
COMPLETED 05-20-77  COMPUTER RUN 06/09/77  DATA 0975/PROG 0876 FUND
STND DEV. ION BALANCE -9.99      CA    MG    NA    K    CL   SO4   HCO3  CO3   NO3
SEGMENT        MPDES            51.9  41.4   6.8  0.0  0.7  99.3   0.0  0.0   0.0
CALC. MEQ/L= INSUFFICIENT DATA                                           77W047
```

25-008, #15: SW-2 and SE-2 sample location


25-008, #17: SW-1 sample location

25-008, #18: WR-2

25-008, #19: Residence; GW-2 sample location

25-008, #20: Seep from WR-1 (reclaimed) in vegetation failure area; GW-1 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: RED MOUNTAIN **PA#:** 25-019

Date: August 19, 1993 **Time:** 1500-1630
Date: August 20, 1993 **Time:** 1000-1330

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Belanger, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Clear; sunny; warm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #4: Shaft at WR-4; #5: WR-4A; #6: WR-1 and GW-1; #7: WR-2 and WR-3; #8: WR-4B and WR-5; #9: WR-6A; #10: WR-6B and aqueduct; #11: WR-7; #12: WR-7, stream, and loadout; #13: Shaft at WR-7; #14: WR-8.
Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to site was by truck. Talked to Earl McCurley, MDSL, the morning of August 20, 1993, to see if the workings adjacent to the Red Mountail #13 investigated on August 19 were actually supposed to be included. It was decided that they were.
Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove waste from drainages; stabilize, amend, and revegetate dump material. Backfill open shaft.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): RED MOUNTAIN **PA#:** 25-019

Legal Description: T 8N **;R** 5W **;Sec.** 4 **,** NW**1/4** SE**1/4** ___**1/4**
Sec. 4 **,** NE**1/4** SW**1/4** ___**1/4**

County: LEWIS & CLARK **Mining District:** RIMINI

Latitude: N 46° 28' 15" **Longitude:** W 112° 13' 15"

Primary Drainage Basin and Code: Tenmile Creek/10030101
Secondary Drainage Basin: Tenmile Creek

USGS Quadrangle map name(s): Chessman Reservoir

Mine Type/Commodities: Hardrock/Lead, Zinc, Copper, Silver, Gold

Activity Status: Active___**,Inactive/Exploration**___**,Abandoned** X **.**

Ownership status: Known YX **N**___**; private/public?** Private
Owner, Agent, or Contact (Include address and phone when available)**:** Jim Martin, 3642 Rimini Road, Helena, MT 59601.

Relationship to other mines/sites in the area/district: On the same vein as the Eureka and Alta mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6300' **, Slope** 15°-20° **,**
Aspect Southeast

Land use: Mining___**, Recreational** X **, Residential**___**, Urban**___**,**
Agricultural___**, Other(Specify)**___

Area of disturbed/unvegetated lands? 13 **acres.**
Dimensions:___

Predominant vegetation types: Lodgepole pine, fir, beargrass, Engleman spruce, grouse whortleberry

Access: roads - good X **,poor**___**,4wd** X **,trail**___**.**
Other logistical considerations (proximity to other sites). The site is adjacent to the adjoining Red Mountain (13) site and is located above the Tenmile and Red Water mines. Difficult 4WD access road through private land.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 15 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Open cuts expose a well-defined vein in granite near the contact mass of schist and other metamorphic rocks. Site is located approximately 0.5 mile above the perennial Tenmile Creek on the east side of the drainage. Water discharging from the site flows west into the creek; the creek then flows north away from the site.

Mining/milling history, ore type/tenor, host rock, gangue: General character of the ore was sulfureted, galena predominates, accompanied by zinc blende (sphalerite), chalcopyrite and arsenopyrite in a gangue of milky quartz, altered wallrock, and chalcedony. No published listings of the mine workings were located.

Mine Operation?

Shafts -	Yes X,	No ___,	# 2,	Comment One is an HMO.
Adits -	Yes X,	No ___,	# 3,	Comment All collapsed
Pits -	Yes ___,	No X,	# ___,	Comment
Placers -	Yes ___,	No X,	# ___,	Comment
Other -	Yes ___,	No X,	# ___,	Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

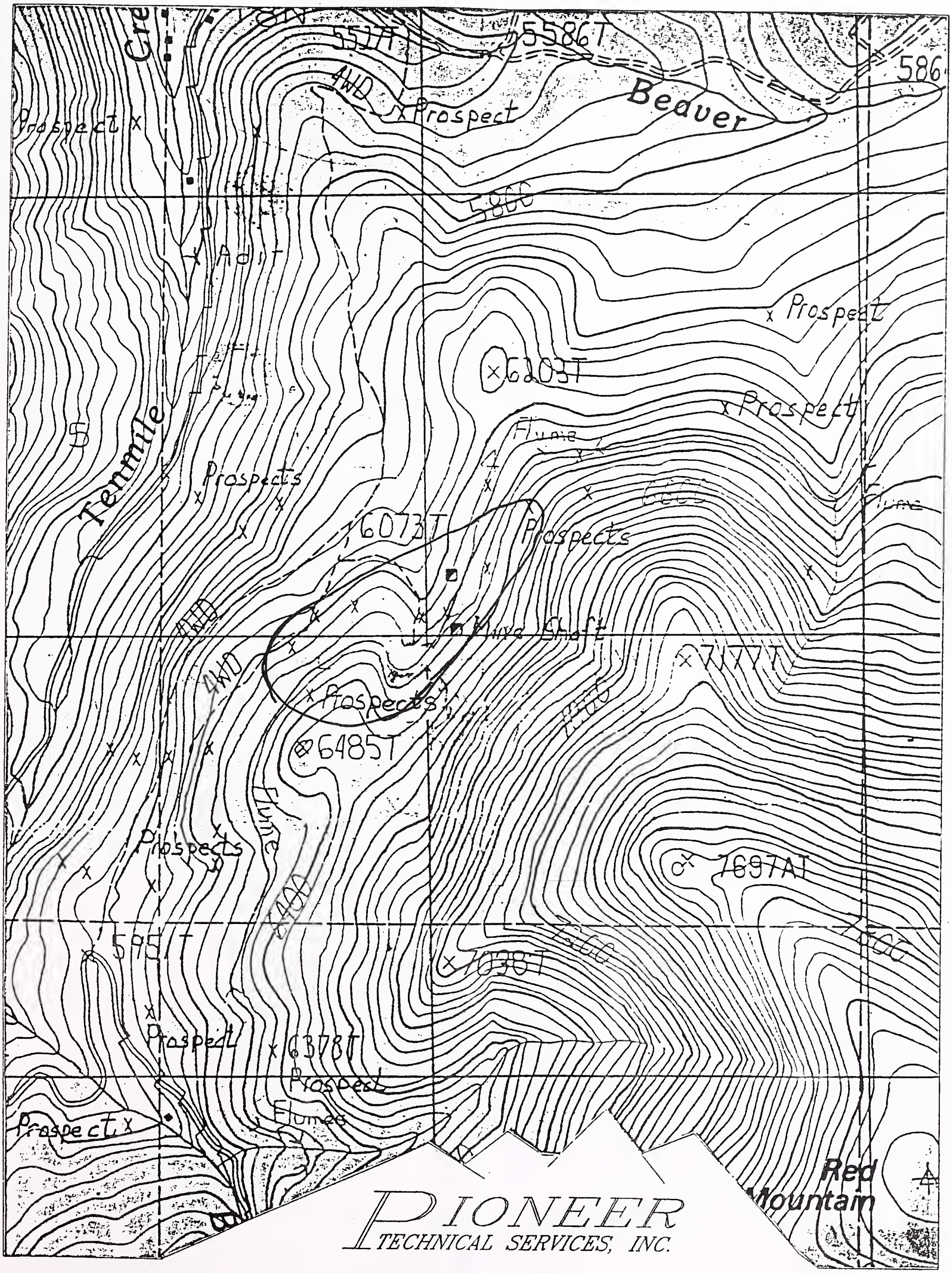
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

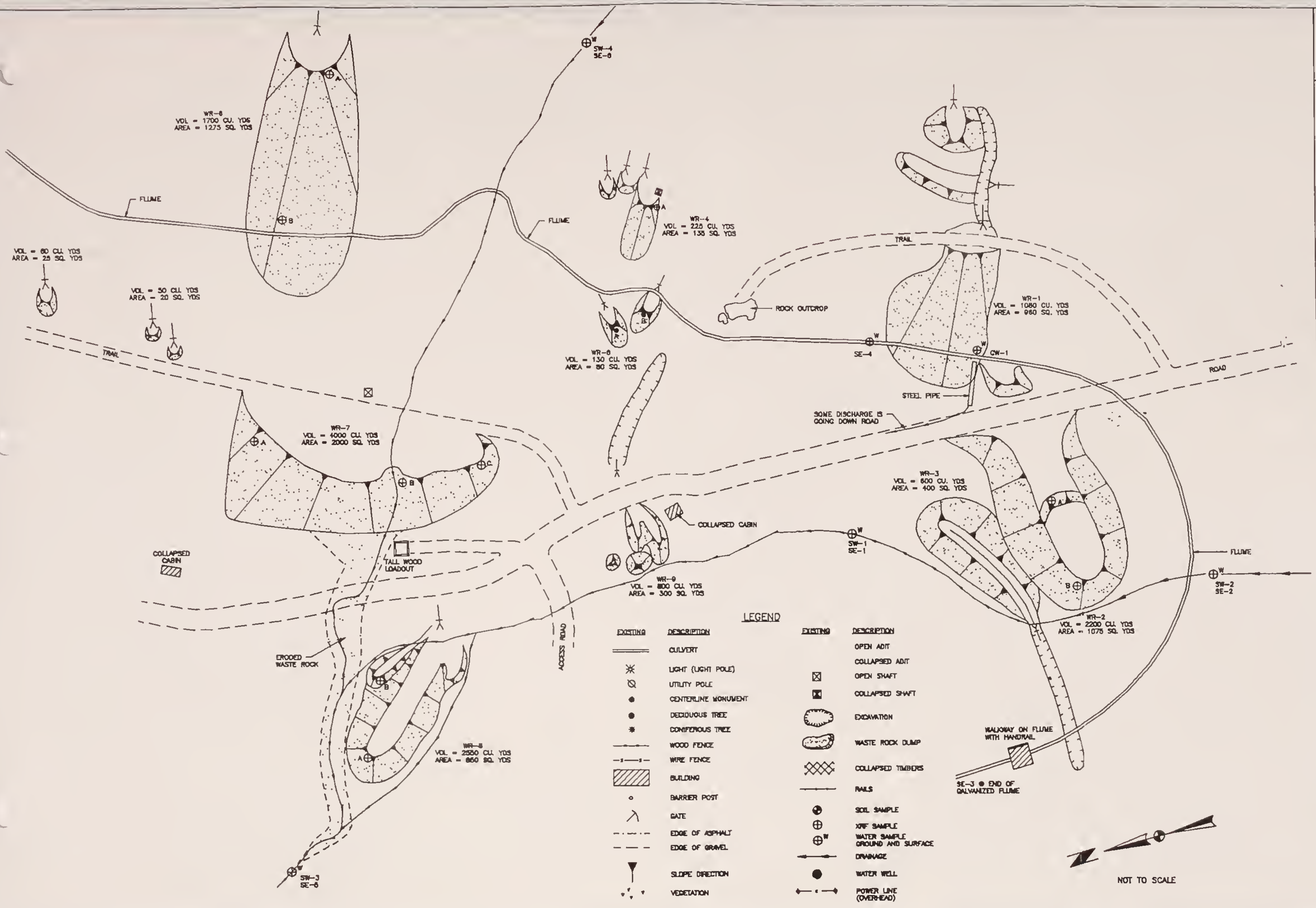
10/29/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123817	08N 05W 04 BA	120.0	30.0	35.00
M:59174	09N 05W 32	62.0	30.0	7.00
M:59175	09N 05W 32 CC	25.0	20.0	0.00
M:59176	09N 05W 32 DAA	29.0	24.0	16.00
M:59177	09N 05W 33	63.0	0.0	10.00
M:131277	09N 05W 33	100.0	12.0	39.00
M:59178	09N 05W 33	35.0	30.0	0.00
M:59180	09N 05W 33	26.0	15.0	6.00
M:59179	09N 05W 33	44.0	20.0	10.00
M:59181	09N 05W 33 CB	80.0	20.0	15.00
M:123830	09N 05W 33 CC	160.0	15.0	25.00
M:123829	09N 05W 33 CC	60.0	20.0	20.00
M:59182	09N 05W 33 CDCC	29.0	12.0	18.00
M:131268	09N 05W 34	55.0	3.5	15.50
M:59183	09N 05W 34 AA	145.0	8.0	20.00



PIONEER
TECHNICAL SERVICES, INC.

RED MOUNTAIN, P.A. NO. 25-019
T08N, R05W, SECTION 04
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

RED MOUNTAIN PA# 25-019
RIMINI DISTRICT LEWIS AND CLARK COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TD&H
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

25-019.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	1,080	Above the flume on the south end of the site	None	6.0 (D)	0.05	25-019-WR-1	08/19/93 2225	T-Metals, ABA
WR-2A	WR	2,200	South end at site, east end of dump	None	3.6 (D)	0.07			
WR-2B	WR		At toe of WR-2	None	5.2 (D)	0.05			
WR-3	WR	600	Dump below WR-2	None	< 3.5 (D)	0.06	25-019-WR-2	08/19/93 2230	T-Metals, ABA
WR-4A	WR	225	Southern most upper shaft at Red Mountain North	None	5.7 (D)	0.06	25-019-WR-3	08/20/93 1755	T-Metals, ABA
WR-4B	WR		Orange sand below flume at Red Mountain North	None	5.6 (D)	0.075			
WR-5	WR	130	Smaller dump below WR-4	None	6.2 (D)	0.045			
WR-6A	WR	1,700	Upper northern collapsed adit	None	< 3.5 (D)	0.08			
WR-6B	WR		Near top of dump directly above aqueduct	None	5.6 (D)	0.05			
WR-7A	WR	4,000	Large dump assoc. with shaft, north end	None	< 3.5 (D)	0.04	25-019-WR-4	08/20/93 1755	T-Metals, ABA
WR-7B	WR		Center of large dump assoc. with shaft	None	< 3.5 (D)	0.05			
WR-7C	WR		South end of large dump	None	4.0 (D)	0.06			
WR-8A	WR	2,550	On end	None	4.2 (D)	0.04			
WR-8B	WR		Southeast knob	None	< 3.5 (D)	0.06			
WR-9	WR	800	Dump between WR-3 and WR-8	None	N/A	N/A	N/A	N/A	N/A
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	25-019-SS-1	08/19/93 1600	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-019-WR-1 is composite of WR-1, and WR-2A and -2B. 25-019-WR-2 is grab of WR-3. 25-019-WR-3 is composite of WR-4A and -4B, WR-5, and WR-6A and -6B. 25-019-WR-4 is composite of WR-7A through -7C, and WR-8A and -8B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes_X_, No___, Number:_1_ Identification:_Seep on WR-1; sampled as GW-1._

Groundwater wells within 5 miles?: Yes_X_, No___;
Number of well logs:_259_

Distance to nearest well used for drinking?_1/2 mile to residence at Red Water_

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable_X_, Possible____, Unlikely____.
There is abundant disturbance at this site and the elevated metal values in the dumps, along with surface water flowing over dump material, which is probably causing localize groundwater contamination.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	SP	Seepage from WR-1	< 1 gpm (E)	6.67	190	-185	7.5	14	N/A	25-019-GW-1	08/19/93 1615	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Unnamed tributary to Tenmile Creek. The topographic map does not indicate direct surface connection with Tenmile Creek.

Dry streambeds: Yes X, No ___, Name(s): Water supply flume for Chessman Reservior is dry at this time.

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-7 and WR-8

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? ___
High Flow: 25 gpm, Average Flow: 5 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ___, Describe: Unnamed discharge flows through WR-7 and WR-8 highly degrading the water. A small branch of this tributary flows along the base of WR-2, WR-3, and WR-9.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Tenmile Creek: Fishery, wetland, stock watering, irrigation, drinking water supply. Chessman Reservior flumes drinking water supply.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? > 1000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Sedimentation, erosional, and turbidity problems start within 10 feet of first contact with dumps.

SURFACE WATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downgradient of dumps 1, 2 and 3	5.64	50	-211	10.2	10	8 gpm (M)	25-019-SW-1	08/19/93 1600	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downgradient of dumps 1, 2 and 3	N/A	N/A	N/A	N/A	N/A	N/A	25-019-SE-1	08/19/93 1530	T-Metals
SW-2	SW	Upgradient of dumps 1, 2 and 3	7.37	70	-162.3	9.8	11	8 gpm (M)	25-019-SW-2	08/19/93 1600	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upgradient of dumps 1, 2 and 3	N/A	N/A	N/A	N/A	N/A	N/A	25-019-SE-2	08/19/93 1600	T-Metals
SW-3	SW	Downgradient at Red Mountain North	3.10	205	235.7	12.1	< 10	13 gpm (M)	25-019-SW-3	08/20/93 1120	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	In flume upgradient of dumps 1, 2 and 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SW-4	SW	Upgradient above aqueduct at Red Mountain North	5.45	65	69.3	7.7	< 10	7 gpm (M)	25-019-SW-4	08/20/93 1200	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-4	SE	In flume downgradient of WR-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-5	SE	Downgradient with SW-3	N/A	N/A	N/A	N/A	N/A	N/A	25-019-SE-5	08/20/93 1120	T-Metals
SE-6	SE	Upgradient with SW-4	N/A	N/A	N/A	N/A	N/A	N/A	25-019-SE-6	08/20/93 1200	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 16 acres on a moderately steep hillside.

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 0.5 mile at Red Water; a new cabin is under construction 200 feet below WR-8.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX	Partial	2,700	8,000	No	None
WR-2	pH; FEOX	Dry	9,675	9,675	Yes	Low
WR-3	pH; FEOX	Partial	3,600	3,600	Yes	Low
WR-4	FEOX	Dry	1,215	1,215	Yes	Low
WR-5	FEOX	Dry	720	710	Yes	Low
WR-6	pH; SO3; FEOX	Dry	11,475	11,475	Yes	Low
WR-7	pH; SO3; FEOX	Partial	18,000	18,000	Yes	Low
WR-8	pH; SO3; FEOX	Partial	7,650	7,650	Yes	Low
WR-9	FEOX	Partial	2,700	2,000	Yes	Low
GW-1	Long algae at discharge point	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: __________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:________

Population within 1 mile: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________

Evidence of recreational use on site: Yes X , No____, Describe: Campfire rings; vehicle tracks

Accessibility - Fences, warning signs, closed roads? Some private gates to go through and road is definite 4WD.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes X , No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No X , Comment________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium___, Low X
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations: Open shaft approx. 30 feet deep associated with WR-7

Hazardous structures: Yes X , No___, Number 1 , types and locations: Tall wooden loadout

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 1 , types and locations: WR-7 is badly eroded.

Fire and/or Explosion hazards: Yes X , No___, Explain: Wooden structure

Bibliography

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MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Red Mountain, Prepared by Daphne Digrindakis, September 1, 1982.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Red Mountain, Prepared by Robert Peccia and Associates, July 14, 1988.

USGS, Geology and Mineral Deposits, Jefferson City Quadrangle, Montana, Professional Paper 428, Author Unknown, Date Unknown, p. 56.

USGS, Greater Helena Mining Region, Montana, Bulletin 842, Author Unknown, Date Unknown, p. 249.

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LABORATORY ANALYTICAL DATA

RED MOUNTAIN
PA NO. 25-019

Red Mountain (13) PA# 25–019
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/19/93

SOLID MATRIX ANALYSES

Metals in soils — Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25–019–SE–1	54.5	36.6	1.0 UJ	9.52 J	2.53 J	28.9	8480	0.040 U	1020	7.74 J	62.9	6.73 U	175	NR
25–019–SE–2	67.4	14.1	1.1 UJ	2.33 J	1.46 U	2.56	3300	0.032 U	312	2.56 U	80.8	7.42 U	50.5	NR
25–019–SE–5	5550	13.1	1.0 UJ	1.6 J	1.41 U	119	14000	0.157	176	2.46 U	2330	47.2	194	NR
25–019–SE–6	84.1	21.7	1.0 UJ	2.3 J	1.36 U	4.65	4420	0.057	691	2.37 U	129	6.88 U	73.3	NR
25–019–WR–1	3900	9.22	1.0 UJ	1.17 J	1.31 U	77.5	15400	0.421	49.4	2.3 U	2790	33	192	NR
25–019–WR–2	19000	39.4	0.9 UJ	1.66 J	1.28 U	23.2	20200	1.16	18.5	2.24 U	4080	55.2	189	NR
25–019–WR–3	7010	29.1	0.8 UJ	3.08 J	1.27 J	136	17900	0.84	762	3.17 J	6120	164	489	NR
25–019–WR–4	4190	19	0.7 UJ	0.82 J	0.97 U	304	14000	0.572	33.1	1.71 U	7860	93.8	373	NR
BACKGROUND	103	63.4	0.8 UJ	6.86 J	4.35 J	15.4	9030	0.047	1610	6.69 J	258	9.78	117	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25–019–WR–1	0.25	7.81	–0.6	–8.4	0.24	<0.01	0.01	0	–0.67
25–019–WR–2	1.92	60	–3.5	–63.	0.6	0.92	0.4	28.7	–32.3
25–019–WR–3	0.56	17.5	–1.3	–18.	0.34	0.04	0.18	1.25	–2.63
25–019–WR–4	0.62	19.4	–2.7	–22.	0.47	0.02	0.13	0.62	–3.34

WATER MATRIX ANALYSES

Metals in Water — Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25–019–GW–1	71.2	2.27	3.63	9.7 U	6.83 U	14.2 J	489	0.12 U	1020	16.5 J	52.6 J	30.7 U	1470 J	44.4
25–019–SW–1	11.8	3.2	2.57 U	9.7 U	6.83 U	1.55 U	165	0.12 U	20.9	12.7 U	3.36 J	30.7 U	23.2 J	9
25–019–SW–2	13	2.9	2.57 U	9.7 U	6.83 U	1.55 U	159	0.12 U	4.73	12.7 U	2.39 J	30.7 U	18.6 J	7.8
25–019–SW–3	45.8	5.33	15.4	9.7 U	6.83 U	199 J	1210	0.23 J	1230	21.8 J	58.2 J	30.7 U	2700 J	27
25–019–SW–4	3.66	4.27	2.57 U	9.7 U	6.83 U	1.63 J	223	0.2 J	7.57	12.7 U	3.49 J	30.7 U	23.2 J	8

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry — Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
25–019–GW–1	19	< 5.0	40	< 0.05	NR
25–019–SW–1	56	< 5.0	5	< 0.05	NR
25–019–SW–2	48	< 5.0	< 5	< 0.05	NR
25–019–SW–3	116	< 5.0	53	0.2	NR
25–019–SW–4	45	< 5.0	< 5.0	0.51	NR

LEGEND

SE1 – Downgradient of waste rock dump 1,2, and 3.
SE2 – Upgradient of waste rock dumps 1, 2, and 3.
SE5 – Downgradient with sample SW3.
SE6 – Upgradient with sample SW4.
WR1 – Composite of subsamples WR1, 2A, and 2B.
WR2 – Sample of the WR3 subsample.
WR3 – Composite of the subsamples WR4A, 4B, 5, 6A, and 6B.
WR4 – Composite of the subsamples WR7A, 7B, 7C, 8A, and 8B.
BACKGROUND – From the Red Mountain Mine (25–019–SS–1).

GW1 – Seepage from waste rock dump 1.
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.
SW3 – Downgradient at Red Mountain N.
SW4 – Upgradient, above aquiduct at Red Mountain N.

XRF ANALYSIS RESULTS

RED MOUNTAIN
PA NO. 25-019

MDSL AMRB/PIONEER 4/9/93

Mine Name: Red Mountain PA# 25-019
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-019-SE-3		21022.6	9545.93	2881.34		2117.43	31090.9		116.348 *	1031.01	121.911	298.847
25-019-SE-4		24488.3	4158.58	1580.33	148.952 *	1724.22	18981		83.421 *	347.659	465.667	177.955
25-019-SS-1		15376.2	6538.02	2708.18		2696.1	20433.1		61.3167 *	250.071	223.694	290.648
25-019-WR2-A		27739.5	3115.48	1545.3		456.611 *	30746.3		188.169	343.008	5480.2	86.7057
25-019-WR2-B		31953.5	1208.37	1090.82		351.861 *	21725.8		102.462 *	178.437	4220.94	59.4506
25-019-WR4-A		28385.9	1688.94	1615.35		550.473 *	38325.4		151.698 *	489.166	8044.88	83.9801
25-019-WR4-B		18449.7	1344.55	1657.47		317.514 *	52024.4		221.466	738.894	12310.2	131.268
25-019-WR6-A		36961.2	1699.24	687.488			21101		173.967	304.84	12576.5	15.6944 *
25-019-WR6-B		39593.5	1270.28	714.959		443.123 *	18233.2		94.0528 *	133.078 *	7271.76	47.4776
25-019-WR7-A		29148.9	10488.8	1460.89		517.887 *	28657.7		226.571	307.061	5302.62	128.875
25-019-WR7-B		24356.2	5646.35	1917.61			30074.3	274.54 *	324.601	375.618	14998.1	69.3324
25-019-WR7-C		23884.5	1516.65	1947.22		387.87 *	27566.1		460.531	393.829	1444.82	98.5516
25-019-WR8-A		30154.6	1560.17	1013.34		364.831 *	23417.6		489.675	381.578	4248.51	66.0394
25-019-WR8-B		32288.6	1547.12	1656.27		314.767 *	18915.8	389.548 *	236.828	602.999	3444.78	55.5468
25-019-WR-1		33459.1	1536.38	994.026		899.223 *	23933.3		76.3072 *	209.552	3102.13	59.3013
25-019-WR-1-COMP		30049	1509.04	1181.92		666.055 *	27515.9	272.177 *	114.448 *	266.299	4841.9	70.4086
25-019-WR-3		33409.7	1155.47	1581.27		565.418 *	31932.5		56.3221 *	264.891	23247.9	47.0059
25-019-WR-3-COMP		30945.9	2221.81	1475.51		1336.96	31693.6		187.569	584.571	10344.2	115.603
25-019-WR-4-COMP		30740.3	2195.03	1768.41		349.099 *	21321.6		336.817	354.924	4570.02	79.8291
25-019-WR-5		17374.6	4677.01	2507.96		6326.31	33714.8		193.237	1565.17	2012.81	241.063

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-019-SE-3	231.89			74.2194	208.703			558.886			32.8161
25-019-SE-4	129.668		5.56948 *	301.77	226.156			468.398			30.3735
25-019-SS-1	157.892			264.67	188.751		42.1367 *	414.616			33.5025
25-019-WR2-A	201.665		11.4691 *	3046.93	254.747		202.881 *	359.946			33.6555 *
25-019-WR2-B	139.931		7.75094 *	2057.4	281.694		104.829 *	234.979	135.45 *		32.5814 *
25-019-WR4-A	154.93			3233.34	264.872		229.263	345.738	114.927 *		36.7266 *
25-019-WR4-B	173.585		8.9517 *	3794.82	211.677		431.771	604.812	165.137 *		19.5238 *
25-019-WR6-A	75.3194			4592.77	284.547		468.544	101.039	116.366 *		30.4709 *
25-019-WR6-B	115.757			3610.35	277.923		234.789	226.095	98.5837 *		20.1016 *
25-019-WR7-A	133.694			2531.01	227.287		131.925 *	423.381			24.3613 *
25-019-WR7-B	143.554			4907.67	225.441		349.974	217.022			
25-019-WR7-C	140.885			5839.09	193.154		283.435	239.616	128.775 *		38.2003 *
25-019-WR8-A	114.071		5.90752 *	8335.66	230.018	165.973 *	227.106	269.066	108.631 *		24.3566 *
25-019-WR8-B	167.451			6106.64	265.534	190.102 *	366.447	215.919			40.3718 *
25-019-WR-1	131.634		11.529 *	1607.04	297.776		108.726 *	298.789			38.1498
25-019-WR-1-COMP	140.603		6.17602 *	2160.73	281.496		117.415 *	281.825	131.17 *		27.1704 *
25-019-WR-3	181.004		13.699 *	3879.04	334.87		136.775 *	149.807	136.435 *		25.1029 *
25-019-WR-3-COMP	152.124			4167.13	255.498		335.277	397.792	107.511 *		21.0181 *
25-019-WR-4-COMP	130.205			5323.99	239.818		268.156	256.205			33.4282 *
25-019-WR-5	174.386			2691.31	219.386	181.646 *	144.627 *	754.993	154.18 *		31.0487 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

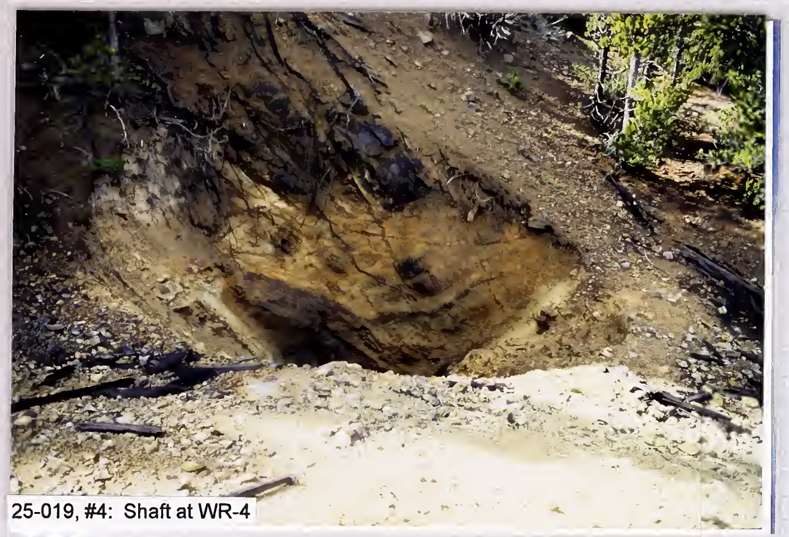
RED MOUNTAIN
PA NO. 25-019

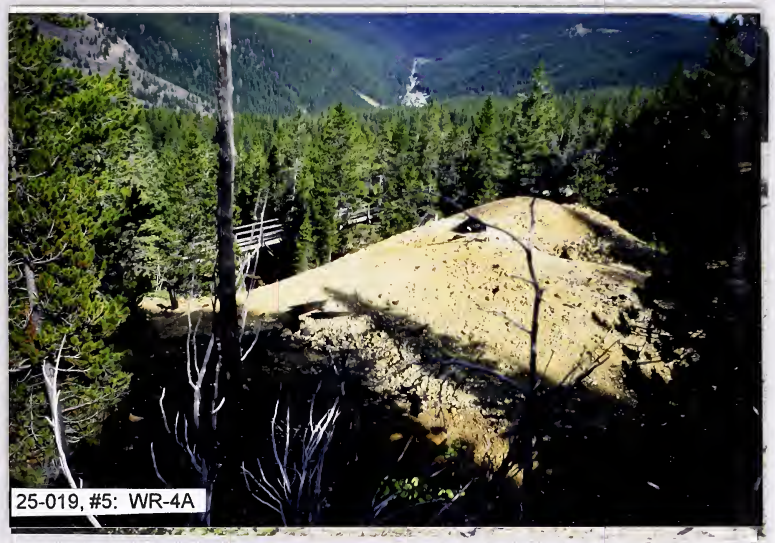
AIMSS SCORESHEET

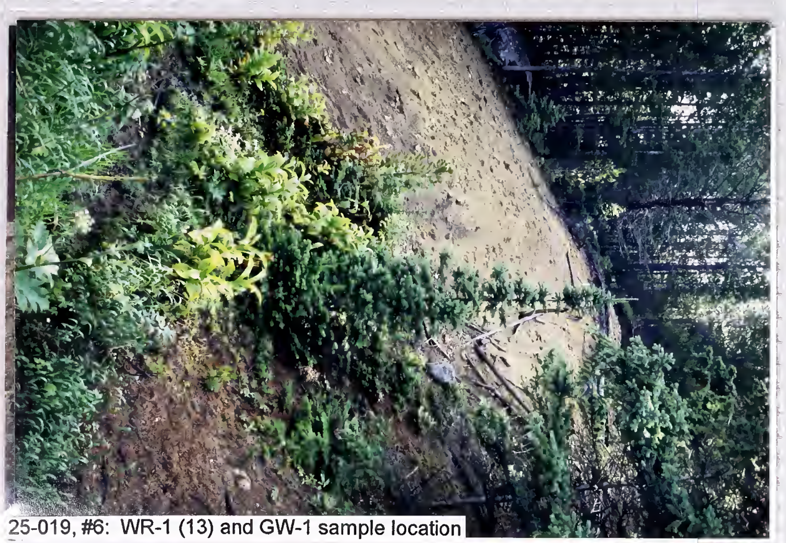
SITE NAME: RED MOUNTAIN
PA NUMBER: 25-019

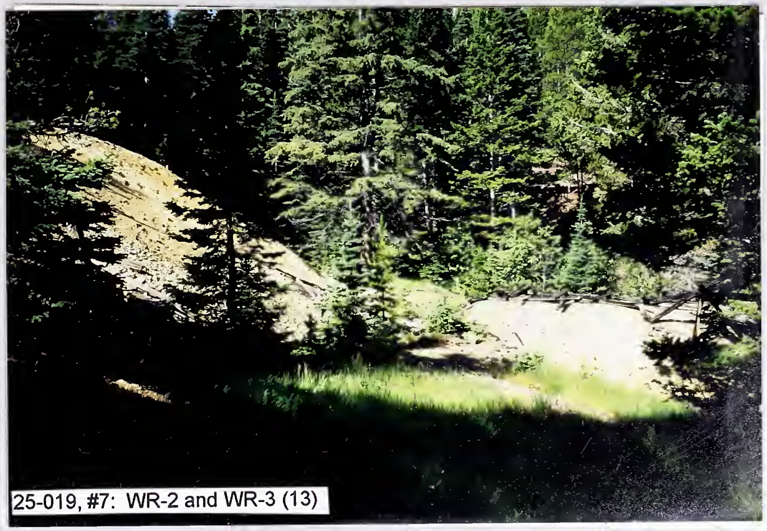
LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	74.134
6		WELLS - 1 MI. x 2.5		37.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		244
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	286.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	8495756
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	77.975
16		DRINKING WATER POP'N		2450
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	2474
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	154328120
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.501
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	14004
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.333
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	20
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	9999
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**1628.48**

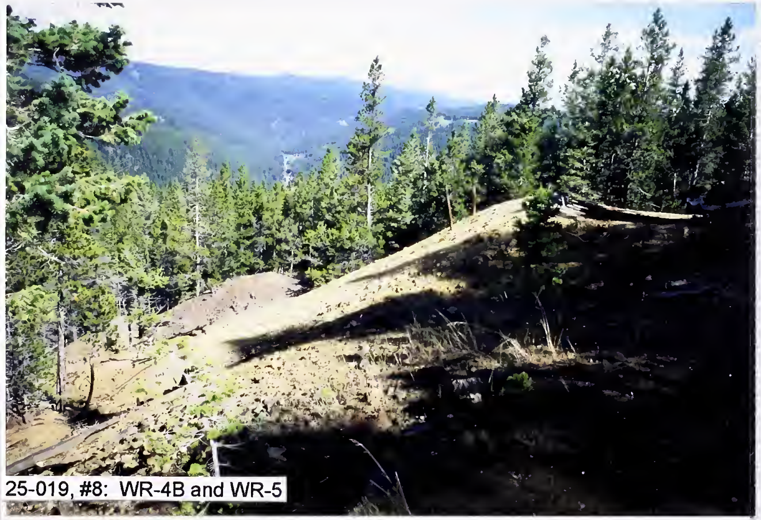
LINE NO.		SITE SAFETY	SITE NAME: / PA NUMBER:	RED MOUNTAIN / 25-019
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	140
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	20
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**28.00**


25-019, #4: Shaft at WR-4

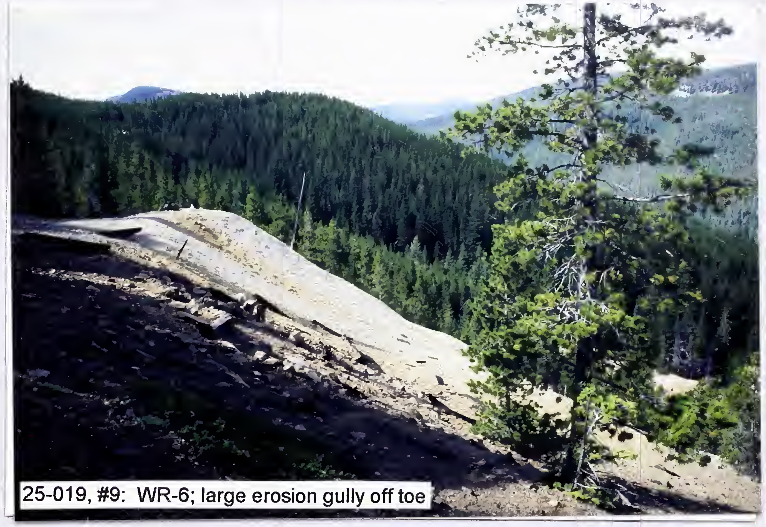

25-019, #5: WR-4A


25-019, #6: WR-1 (13) and GW-1 sample location

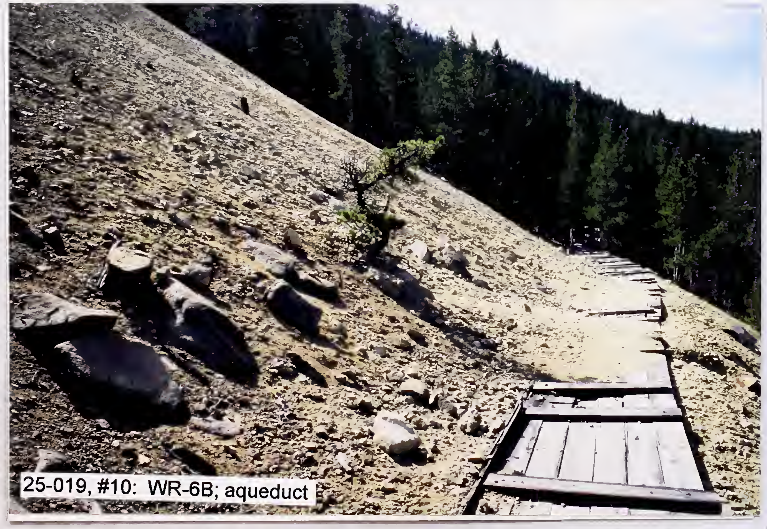

25-019, #7: WR-2 and WR-3 (13)



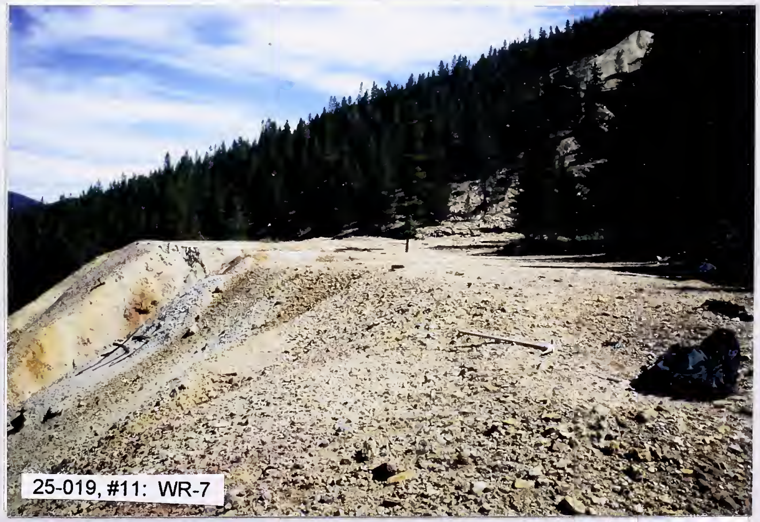
25-019, #8: WR-4B and WR-5



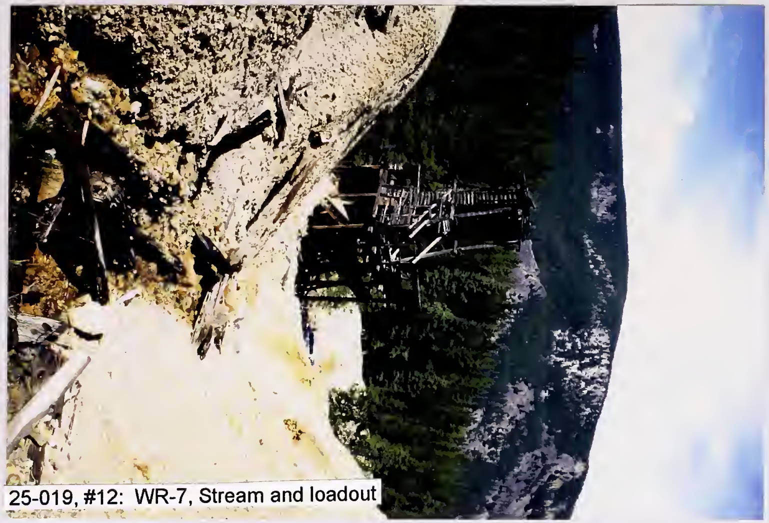
25-019, #9: WR-6; large erosion gully off toe

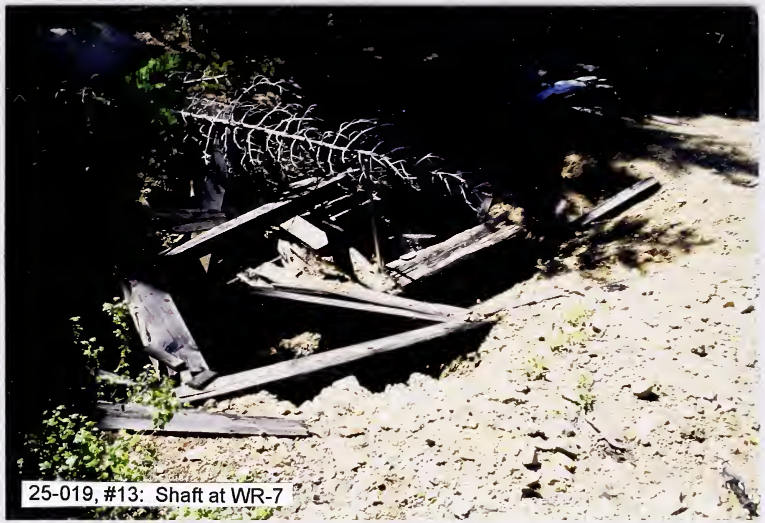


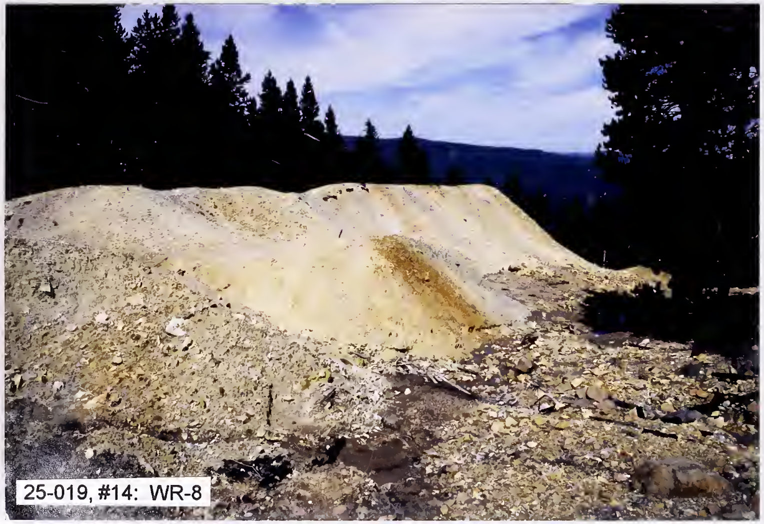
25-019, #10: WR-6B; aqueduct



25-019, #11: WR-7


25-019, #12: WR-7, Stream and loadout


25-019, #13: Shaft at WR-7


25-019, #14: WR-8

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: LOWER TENMILE PA#: 25-030

Date: July 15, 1993 Time: 1600-1830

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Sunny; cloudy; warm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): No photos were taken. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): This site is otherwise known as the Engstrom Mill. Access to site was by truck; residential area is surrounding and on top of the reclaimed tailings.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Mill is reclaimed. Tailings are mostly reclaimed, but are along an old irrigation ditch now used as a subdivision "stream". Move tails away from this streamlet and revegetate minor unvegetated tails.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LOWER TENMILE **PA#:** 25-030

Legal Description: **T** 9N **;R** 5W **;Sec.** 3 **,** SE**1/4** NW**1/4** **1/4**

County: LEWIS & CLARK **Mining District:** RIMINI

Latitude: N 46° 33' 52" **Longitude:** W 112° 13' 13"

Primary Drainage Basin and Code: Tenmile Creek/10030101
Secondary Drainage Basin: Tenmile Creek

USGS Quadrangle map name(s): Black Mountain

Mine Type/Commodities: Hardrock/Unknown

Activity Status: **Active**___, **Inactive/Exploration**___, **Abandoned** X.

Ownership status: **Known Y**X **N**__; **private/public?** Private
Owner, Agent, or Contact(Include address and phone when available)**:** Marcus H. Kelley, Box 4753, Helena, MT 59604.

Relationship to other mines/sites in the area/district: Another mill located to the east is alledged to have been reclaimed many years ago, possibly by MDSL. The site is downstream from the Rimini district.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Possibly reclaimed by MDSL.

General site features: **Elevation** 4550', **Slope** Flat, **Aspect** North

Land use: **Mining**___, **Recreational** X, **Residential** X, **Urban**___, **Agricultural** X, **Other(Specify)**

Area of disturbed/unvegetated lands? 0.3 **acres.**
Dimensions: Area has been reclaimed; unable to tell dimensions. Tailings are estimated to be 500 feet x 500 feet, but are probably much larger.

Predominant vegetation types: Pine, willow, grasses

Access: **roads - good** X, **poor**___, **4wd**___, **trail**___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 73 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site lies on perennial Tenmile Creek.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes____, No X, # ____, Comment
Adits - Yes____, No X, # ____, Comment
Pits - Yes____, No X, # ____, Comment
Placers - Yes____, No X, # ____, Comment
Other - Yes____, No X, # ____, Comment

Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
Unknown

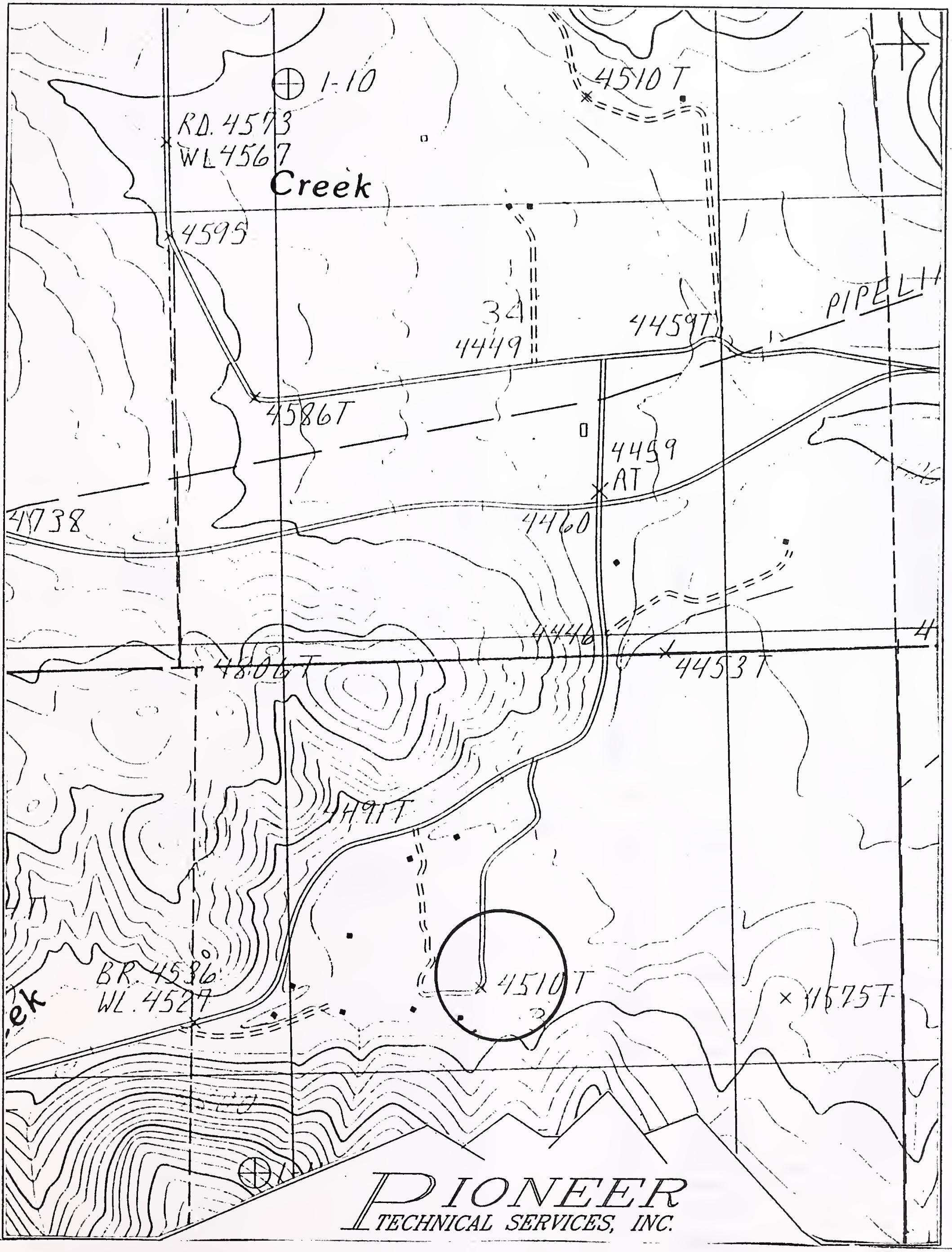
Montana Bureau of Mines and Geology
Water Well Log Data

11/03/1993

W[illegible]l No.	Location	Depth	Yield	Static Water Level
M:59066	09N 05W 03	37.0	15.0	0.00
M:59068	09N 05W 03	85.0	15.0	30.00
M:59064	09N 05W 03	67.0	15.0	20.00
M:59067	09N 05W 03	33.0	10.0	16.00
M:59063	09N 05W 03	63.0	12.0	16.00
M:59065	09N 05W 03	155.0	30.0	31.00
M:59069	09N 05W 03	105.0	30.0	39.00
M:59070	09N 05W 03	25.0	25.0	17.00
M:59072	09N 05W 03	0.0	300.0	52.00
M:59062	09N 05W 03	265.0	10.0	40.00
M:59071	09N 05W 03	170.0	10.0	72.00
M:59073	09N 05W 03 A	150.0	0.0	19.00
M:125803	09N 05W 03 AB	65.0	20.0	35.00
M:59074	09N 05W 03 AB	145.0	20.0	31.00
M:59075	09N 05W 03 AD	48.0	0.0	35.00
M:127880	09N 05W 03 AD	250.0	6.0	20.00
M:122595	09N 05W 03 AD	140.0	90.0	35.00
M:59076	09N 05W 03 ADB	207.0	7.0	51.00
M:5500	09N 05W 03 ADBB	207.0	0.0	42.35
M:59077	09N 05W 03 B	32.0	11.0	16.00
M:59080	09N 05W 03 B	100.0	11.0	35.00
M:59078	09N 05W 03 B	36.0	12.0	24.00
M:59079	09N 05W 03 B	80.0	20.0	25.00
M:59081	09N 05W 03 BCA	135.0	12.0	6.00
[illegible]120726	09N 05W 03 BCB	300.0	17.0	39.00
M:59082	09N 05W 03 BCD	160.0	15.0	40.00
M:59084	09N 05W 03 BD	124.0	10.0	50.00
M:59085	09N 05W 03 BD	100.0	20.0	40.00
M:59083	09N 05W 03 BD	39.0	20.0	26.00
M:120727	09N 05W 03 BDD	30.0	2.0	0.00
M:59086	09N 05W 03 DC	220.0	15.0	0.00
M:59087	09N 05W 03 DD	140.0	15.0	20.00
M:59088	09N 05W 04 BA	24.0	5.0	5.00
M:121394	09N 05W 04 C	320.0	5.0	120.00
M:59093	09N 05W 09 C	8.0	100.0	3.00
M:59094	09N 05W 09 CB	25.0	20.0	15.00
M:59095	09N 05W 09 CB	35.0	12.0	15.00
M:122596	09N 05W 09 CB	180.0	8.0	35.00
M:131890	10N 05W 33	165.0	15.0	55.00
M:26673	10N 05W 33	46.0	30.0	12.00
M:62987	10N 05W 33	300.0	8.0	50.00
M:62986	10N 05W 33	227.0	30.0	60.00
M:62990	10N 05W 33 A	140.0	50.0	30.00
M:62984	10N 05W 33 A	100.0	30.0	15.00
M:62988	10N 05W 33 A	210.0	30.0	27.00
M:62985	10N 05W 33 A	225.0	30.0	32.00
M:62989	10N 05W 33 A	160.0	9.0	30.00
M:62991	10N 05W 33 AA	247.0	15.0	60.00
M:123315	10N 05W 33 AC	370.0	35.0	1.00
[illegible]62992	10N 05W 33 BC	280.0	10.0	70.00
62993	10N 05W 33 C	165.0	12.0	13.00
M:123371	10N 05W 33 CB	300.0	15.0	60.00
M:62994	10N 05W 33 CBB	165.0	20.0	3.00
M:127895	10N 05W 33 CC	120.0	20.0	15.00
M:62996	10N 05W 33 CCD	225.0	20.0	44.00

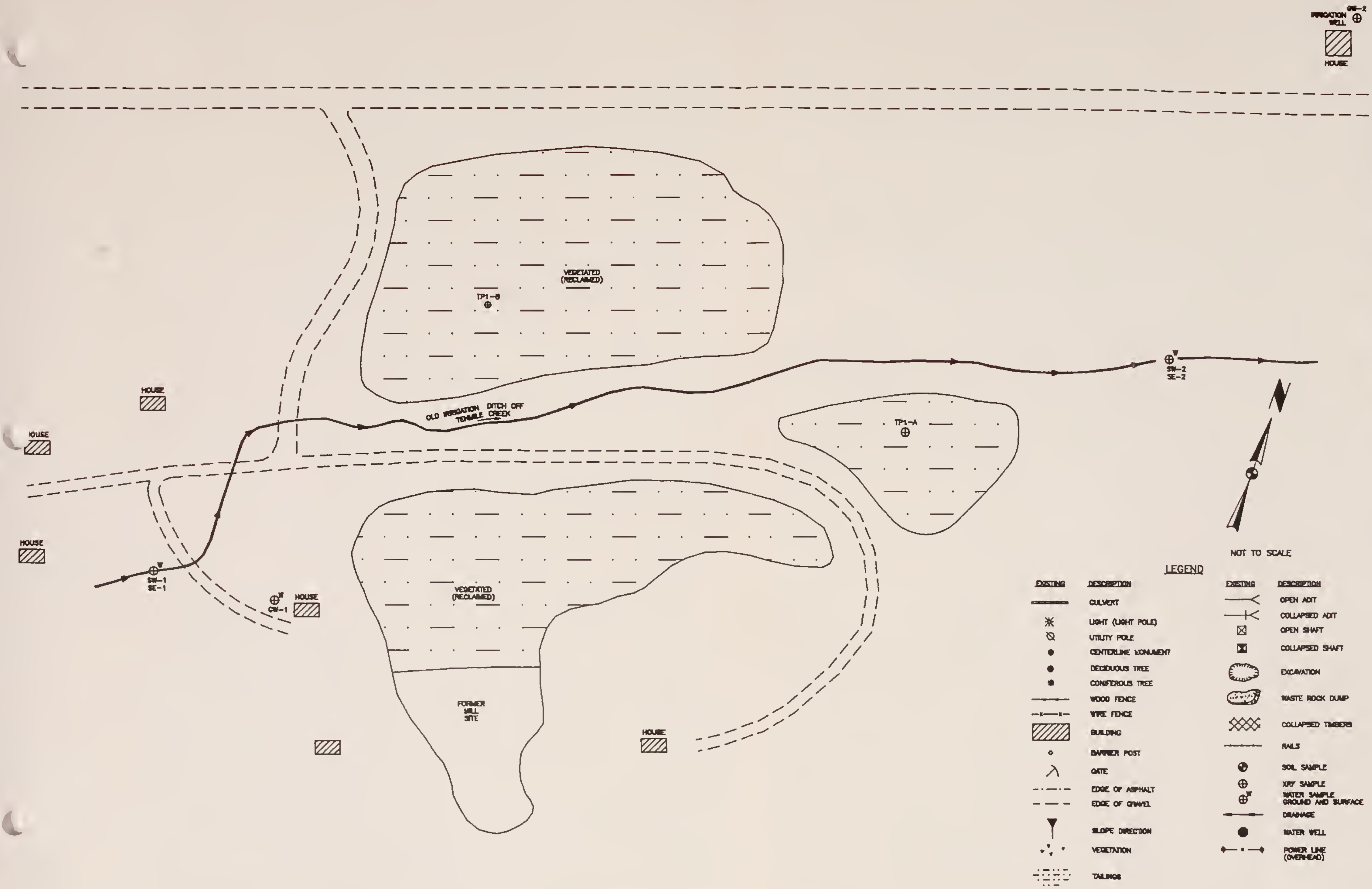
M:128264	10N 05W 33 CCD	101.0	50.0	41.00
M:62995	10N 05W 33 CD	135.0	10.0	15.00
M:131331	10N 05W 33 CDA	102.0	80.0	-53.13

Well No.	Location	Depth	Yield	Static Water Level
M:62997	10N 05W 33 DB	159.0	10.0	112.00
M:128057	10N 05W 33 DCB	201.0	18.0	20.00
M:62998	10N 05W 34 A	265.0	20.0	67.00
M:62999	10N 05W 34 B	187.0	40.0	19.00
M:63000	10N 05W 34 BDAD	30.0	15.0	10.00
M:63001	10N 05W 34 CAD	180.0	10.0	60.00
M:63003	10N 05W 34 DDBB	60.0	300.0	0.00
M:63002	10N 05W 34 DDBB	0.0	40.0	0.00
M:63006	10N 05W 35	75.0	60.0	11.00
M:63005	10N 05W 35	310.0	12.0	18.00
M:63004	10N 05W 35	170.0	2.0	30.00
M:63007	10N 05W 35 CBB	252.0	11.0	32.00
M:63008	10N 05W 35 DA	144.0	10.0	20.00
M:63009	10N 05W 35 DBDD	60.0	2.0	50.00
M:63010	10N 05W 35 DBDD	28.0	20.0	4.00



LOWER TENMILE, P.A. NO. 25-030

T09N, R05W, SECTION 03
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LOWER TENMILE PA# 25-030
RIMINI DISTRICT LEWIS AND CLARK COUNTY

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

SHEET NO.

25-030.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Appears to be sandy

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Area has been completely revegetated so depth and stratification are unknown.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundment

Comments on potential for mitigation: Tailings have already been reclaimed.

SOURCE INVENTORY FORM

SAMPLERS: Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A	TAIL	Est. 13,500	Northeast of road, east of stream	Vegetated	6.5 (D)	0.04	25-030-TP-1	07/15/93 2100	T-Metals, ABA
TP-1B	TAIL	N/A	North of road, west of stream	Vegetated	5.5 (D)	0.04			
TP-1C	TAIL	N/A	Streamside by downgradient well	Vegetated	5.8 (D)	0.04	N/A	N/A	Not Analyzed

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Most of the tailings are vegetated and residential yards; not possible to accurately measure size or volume; volume estimate is a minimum. 25-030-TP-1 is composite of TP-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 276

Distance to nearest well used for drinking? 50 feet

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP)

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Uncontained source; extensive tailings left in the floodplain.

Other observations/notes: There are two City of Helena water wells within four miles, one of which is a well located at the Montana Department of Highways.

GROUNDWATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	RW	Residential well upgradient	5 gpm (E)	7.86	350	-7.7	15.9	106	112	25-030-GW-1	07/15/93 1800	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	RW	Residential well used for irrigation downgradient	20 gpm (E)	7.69	460	N/A	11.8	142	140	25-030-GW-2	07/15/93 1815	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes_X__, No___, Name(s): Unnamed old irrigation ditch off of Tenmile Creek.

Dry streambeds: Yes____, No_X_, Name(s):________

Other surface water: Yes____, No_X_, Name(s)/Description:________

Waste materials within any floodplain: Yes_X__, No___ Source ID(s): TP-1

Approximate Flood frequency? _X_1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.1 during investigation
High Flow: 1.0 cfs , Average Flow: 0.1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between TP-1 and the irrigation ditch.

Surface water draining onto or through waste sources: Yes_X__, No____, Describe: TP-1 has surface water from the irrigation ditch running through it.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Possible irrigation before draining into Tenmile Creek; Tenmile Creek has fisheries, irrigation, agriculture, and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes_X__, No_____, Distance downstream (ft)? 2000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Tailings are in the streambed of the irrigation ditch downstream.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°c	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient of tailings	8.15	90	-20.6	19.0	23	0.1 cfs (M)	25-030-SW-2	07/15/93 1700	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Upgradient of tailings	N/A	N/A	N/A	N/A	N/A	N/A	25-030-SE-1	07/15/93 1700	T-Metals
SW-2	SW	Downgradient of tailings	8.21	90	50	19.0	20	0.1 cfs (M)	25-030-SW-2	07/15/93 1730	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Downgradient of tailings	N/A	N/A	N/A	N/A	N/A	N/A	25-030-SE-2	07/15/93 1730	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? There is up to 10 acres of flat tailings available for treatment, but they are revegetated.

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300_X_; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 0 feet; residences on reclaimed tails.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	FEOX	Dry	Est. 250,000	Est. 12,500	No	Low

Notes and Clarifications: Area is a minimum size estimate.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____,
Describe: Subdivision residences on old tails and floodplain tails.

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_______
Residential

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes_X_, No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:____________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

USGS, Topographic Map, Black Mountain, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

LOWER TENMILE MINE
PA NO. 25-030

MDSL AMRB/PIONEER 4/9/93

Lower Tenmile PA# 25−030
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − TUESDAY
INVESTIGATION DATE: 7/15/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−030−SE−1	111	39.3	4.9	7.2	3.8	53.5	8170	0.141	801	3 U	94	7 UJ	488	NR
25−030−SE−2	715	87.9	3.7	4.8	2.9	30.2	7120	0.111	837	2 U	258	5 UJ	399	NR
25−030−TP−1	3470	27.1	10.6	3.8	2.8	88.3	12300	0.242	313	3 U	2410	17 J	654	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25−030−TP−1	0.07	2.19	3.39	1.2	0.05	0.01	0.01	0.31	3.08

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25−030−GW−1	25.5 J	2.80	2.57 U	9.70 U	6.83 U	24.80	92	0.038 U	4.08 U	12.7 U	0.86 J	30.7 U	7.57 U	60.6
25−030−GW−2	5.30 J	14.50	2.57 U	9.70 U	6.83 U	1.55 U	765	0.038 U	70.4	12.7 U	0.75 J	30.7 U	82.9	90.5
25−030−SW−1	16.5 J	13.50	2.57 U	9.70 U	6.83 U	5.33	205	0.038 U	4.08 U	12.7 U	2.07 J	30.7 U	126	26.4
25−030−SW−2	20.4 J	13.10	2.57 U	9.70 U	6.83 U	5.33	199	0.038 U	4.08 U	12.7 U	6.15 J	30.7 U	163	27.7

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	TOTAL CYANIDE
25−030−GW−1	222	< 5.0	46	< 0.05	NR
25−030−GW−2	285	9.3	50	< 0.05	NR
25−030−SW−1	72	< 5.0	11	< 0.05	NR
25−030−SW−2	79	< 5.0	11	< 0.05	NR

LEGEND

SE1 − Upgradient of tailings.
SE2 − Downgradient of tailings.
TP1 − Composite of subsamples TP1A and 1B.
BACKGROUND − From the Red Water Mine (25−007−SS−1).

GW1 − Residential well, upgradient.
GW2 − Residential well used for irrigation, downgradient.
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.

XRF ANALYSIS RESULTS

LOWER TENMILE MINE
PA NO. 25-030

MDSL AMRB/PIONEER 4/9/93

Mine Name: Lower Tenmile/Engstrom Millsite PA# 25-030
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-030-TP1-A		23865.9	6123.58	1323.84		667.729 *	21753.9		91.1722 *	565.307	2539.39	330.754
25-030-TP1-B		19960.6	6435.06	1353.1	156.586 *	781.363 *	19608.8		49.946 *	879.434	3861.37	261.442
25-030-TP-1-COMP		24331.2	5484.01	1103.92		595.897 *	20565.1		67.7978 *	569.033	2685.19	293.526

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-030-TP1-A	122.951		12.9226 *	2057.72	130.979		106.041 *	422.007			18.9843 *
25-030-TP1-B	129.11			1765.37	131.823		52.6748 *	408.284			16.5427 *
25-030-TP-1-COMP	129.917		10.8156 *	2220.37	149.896		72.854 *	436.033	80.7237 *		15.6791 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LOWER TENMILE
PA NO. 25-030

AIMSS SCORESHEET

SITE NAME: LOWER TENMILE MILL
PA NUMBER: 25-030

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
2		EXCEEDENCES		0
3A		CONTAINMENT		10
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	100
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	56.688
6	GW - TARGETS	WELLS - 1 MI. x 2.5		182.5
7		WELLS - 1 TO 4 MI		203
8		NEAREST WELL		10
9		TARGETS SCORE	LINES 6 + 7 + 8	395.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	8968042
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		10
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	500
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	59.009
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		2
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 - 22	25
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	737613
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.590
29	AIR - TARGETS	POPULATION - 4 MILES		100
30		NEAREST RESIDENCE		10
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 - 33	115
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	13570
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		250
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	400
38		LIKELIHOOD SCORE	LINES 36 + 37C	650
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.567
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	50
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	18428
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**97.38**

SITE NAME: LOWER TENMILE MILL
PA NUMBER: 25-030

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	0
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	50
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	0.00

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: ARMSTRONG **PA#:** 25-102

Date: July 15, 1993 **Time:** 1700-2100

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Calm; partly cloudy; 60°F.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #22: Site from top, looking east; #23: Adit #2 and #3; #24: Adit #4.
Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms):
N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Waste rock is a relatively shallow deposit on hill side with a broad bench above the floodplain at the base of the hill. Waste rock should be pushed to the bottom of the hill, consolidated, covered, and revegetated and only reseeding would be required on the hill side. Runon/runoff controls and under drains may be required.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): ARMSTRONG PA#: 25-102

Legal Description: T 8N ;R 5W ;Sec. 6 , NW1/4NW 1/4 ___ 1/4

County: LEWIS & CLARK Mining District: RIMINI

Latitude: N 46° 28' 50" Longitude: W 112° 17' 13"

Primary Drainage Basin and Code: Tenmile Creek/10030101
Secondary Drainage Basin: Minnehaha Creek

USGS Quadrangle map name(s): Three Brothers

Mine Type/Commodities: Hardrock/Lead, Silver

Activity Status: Active ___,Inactive/Exploration X ,Abandoned ___.

Ownership status: Known YX N ___; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Guy Frank Stoner, Box 128, Elliston, MT 59728; Helena National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5900-6200' , Slope 34° ,
Aspect East

Land use: Mining X , Recreational X , Residential ___, Urban ___, Agricultural ___, Other(Specify) ___

Area of disturbed/unvegetated lands? 1.6 acres.
Dimensions: 460' x 150'

Predominant vegetation types: Lodgepole and Ponderosa pines, Douglas fir, alder, willows

Access: roads - good X ,poor ___,4wd ___,trail ___.
Other logistical considerations (proximity to other sites). Locked gate 300 yds from the mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is located within a mile of the headwaters on Minnehaha Creek.

Mining/milling history, ore type/tenor, host rock, gangue: Active intermittently from 1940 to 1948. Sulfide minerals are abundant disseminated and massive pyrite, and sparse galena, sphalerite, and chalcopyrite in a gangue of massive, milky quartz and black tourmaline.

Mine Operation?

Shafts - Yes___, No X, # ____, Comment Ore loadout incorrectly identified as shaft during original inventory

Adits - Yes X, No___, # 6, Comment Adit #1 open; rest caved

Pits - Yes___, No X, # ____, Comment

Placers - Yes___, No X, # ____, Comment

Other - Yes___, No X, # ____, Comment

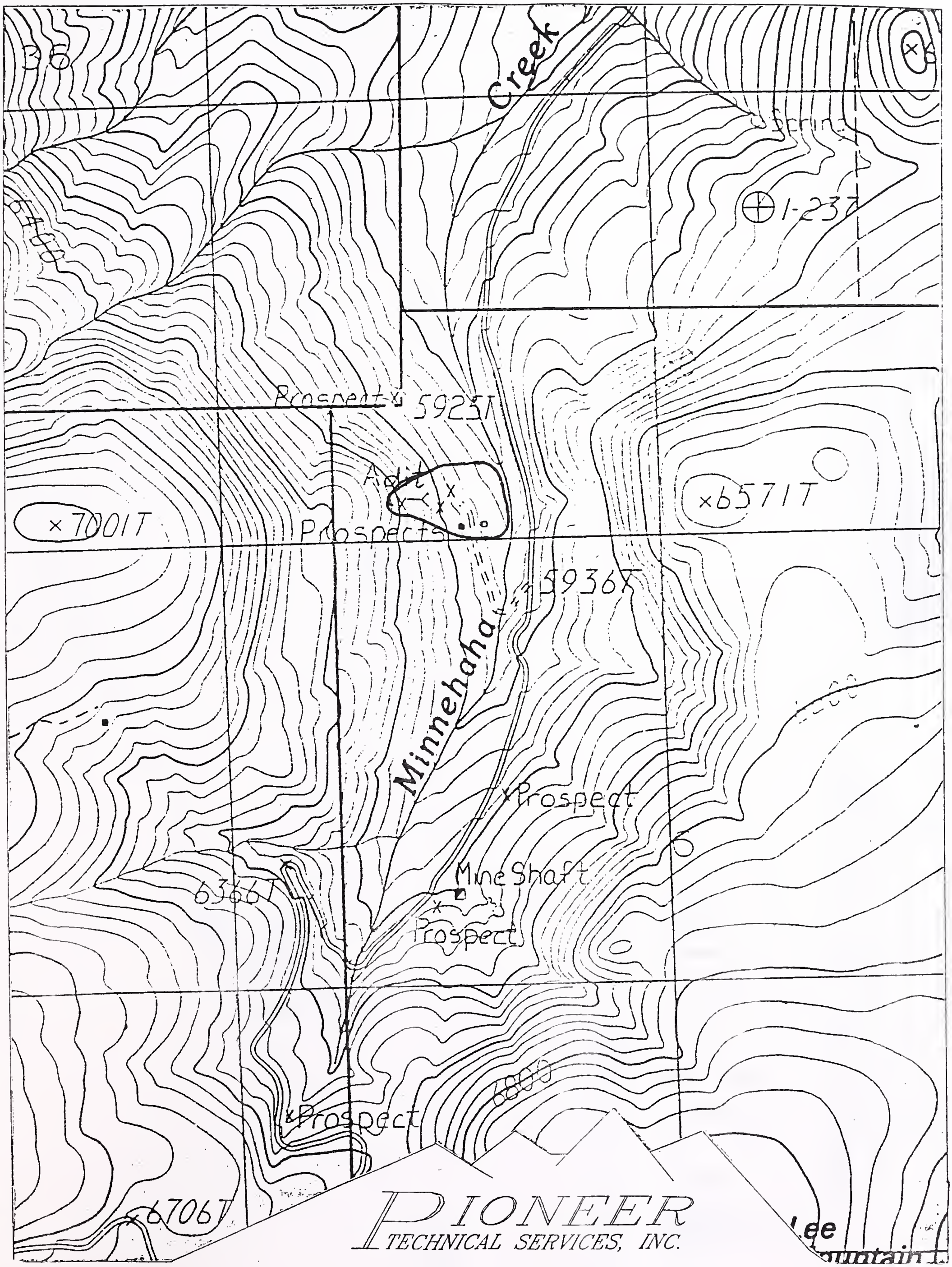
Mill Operation? Yes____, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

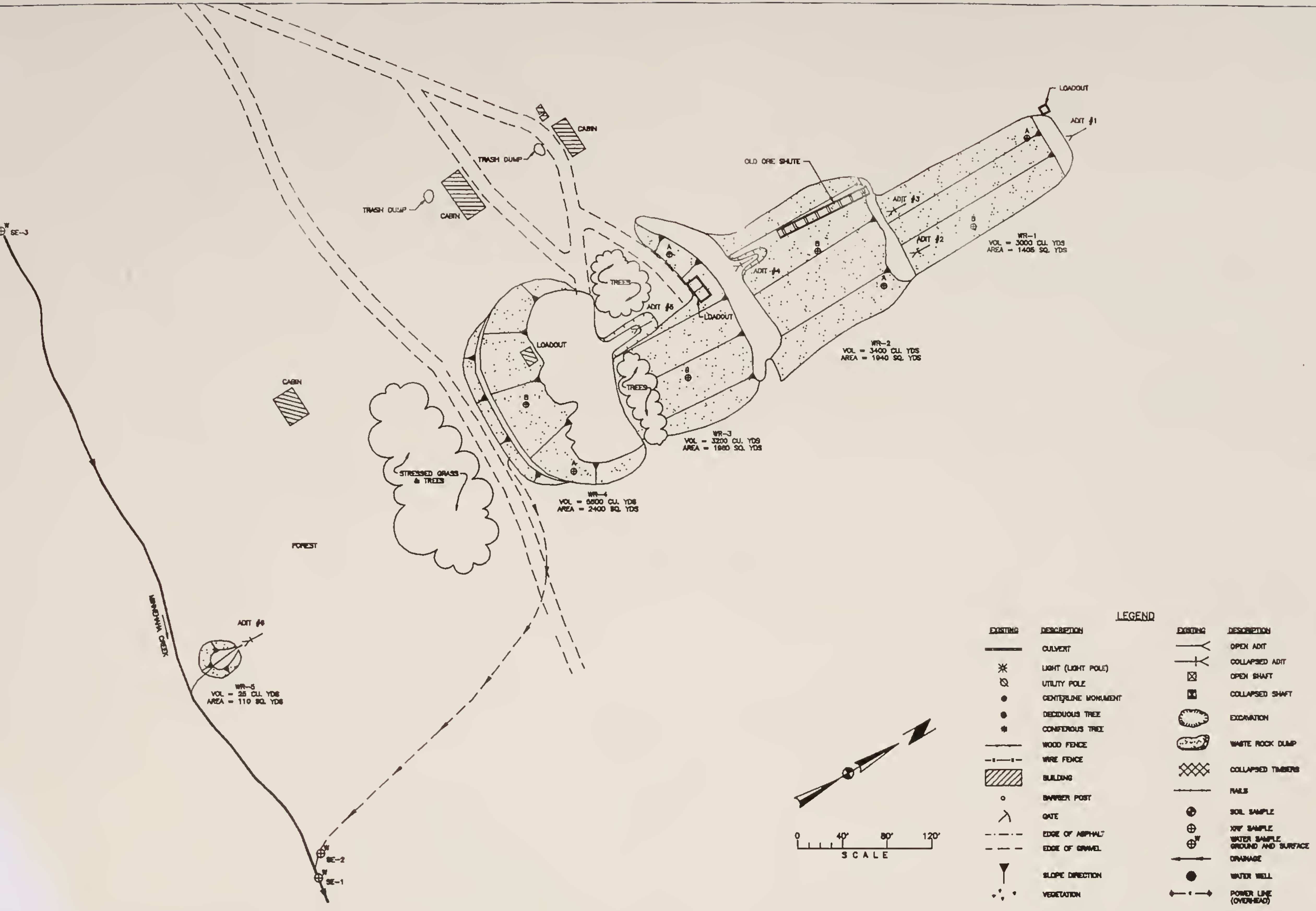
Well No.	Location	Depth	Yield	Static Water Level
M:59174	09N 05W 32	62.0	30.0	7.00
M:59175	09N 05W 32 CC	25.0	20.0	0.00
M:59176	09N 05W 32 DAA	29.0	24.0	16.00



PIONEER
TECHNICAL SERVICES, INC.

ARMSTRONG, P.A. NO. 25-102

T08N, R05W, SECTION 06
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
▬	CULVERT	—<	OPEN ADIT
✳	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
⊘	UTILITY POLE	⊠	OPEN SHAFT
●	CENTERLINE MONUMENT	■	COLLAPSED SHAFT
●	DECIDUOUS TREE	⬭	EXCAVATION
●	CONIFEROUS TREE	⬭	WASTE ROCK DUMP
—	WOOD FENCE	⨯⨯⨯	COLLAPSED TIMBERS
-·—·-	WIRE FENCE	—	RAILS
▨	BUILDING	⊕	SOIL SAMPLE
○	BARRIER POST	⊕	XRF SAMPLE
⋏	GATE	⊕W	WATER SAMPLE GROUND AND SURFACE
-·-·-	EDGE OF ASPHALT	←—	DRAINAGE
- - -	EDGE OF GRAVEL	●	WATER WELL
▼	SLOPE DIRECTION	◆—·—◆	POWER LINE (OVERHEAD)
·:·	VEGETATION		

DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS—BOZEMAN—KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

ARMSTRONG PA# 25-102
RIMINI DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

25-102.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	3,000	10' from Adit #1 on upper dump	None	< 3.5 (D)	0.05	25-102-WR-1	07/16/93 1000	T-Metals, ABA
WR-1B	WR		75' above Adit #2 on WR-1	None	3.6 (D)	0.04			
WR-2A	WR	3,400	Second dump down, 10' from top north of Adit #2	None	< 3.5 (D)	0.04			
WR-2B	WR		North of Adit #4 and 100' above	None	3.5 (D)	0.05			
WR-3A	WR	3,200	Third dump down associated with Adit #3 and #4, south of top of loadout 100'	None	4.35 (D)	0.04	25-102-WR-2	07/16/93 1020	T-Metals, ABA
WR-3B	WR		North side of WR-3 below ore loadouts	None	< 3.5 (D)	0.05			
WR-4A	WR	5,500	Lower large dump associated with Adit #5, north end of WR-4 about 1/2 way down	None	3.7 (D)	0.05			
WR-4B	WR		South side about 1/3 way down	None	3.8 (D)	0.05			
WR-5	WR	25	Small dump below main Minnehaha Creek	None	N/A	N/A	N/A	N/A	N/A
SS-1	WR	N/A	Soil at base of WR-4 with stressed vegetation	N/A	5.6 (D)	0.06	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-102-WR-1 is composite of WR-1A and -1B, and WR-2A and -2B. 25-102-WR-2 is composite of WR-3A and -3B, and WR-4A and -4B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_1_ Identification:_Adit #6; Adit #4 has had discharge in the past_

Filled shafts: Yes___, No_X_, Number:___ Identification:___

Seeps/Springs: Yes_X_, No___, Number:_1_ Identification:_Seep area at base of hill near creek, upgradient from mine._

Groundwater wells within 5 miles?: Yes_X_, No___;
Number of well logs:_259_

Distance to nearest well used for drinking?_Approx. 1.75 miles_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Adit #6 and seeps down at stream have neutral pH (6.5) and moderate SC (200) indicating little contamination. Metal laden runoff may infiltrate to shallow aquifer causing localized contamination.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit #6	2 gpm (E)	6.44	234	185	3.8	N/A	N/A	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Very minimal iron staining. Flow does not reach stream.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Minnehaha Creek

Dry streambeds: Yes X, No ___, Name(s): Runoff path from mine area down to Minnehaha Creek.

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes ___, No X Source ID(s): ___

Approximate Flood frequency? ___1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A

Distance between waste source(s) and nearest surface water body (ft)? 300 feet from base of WR-4 to stream.

Surface water draining onto or through waste sources: Yes ___, No X, Describe: Although erosion of dump material occurs during spring run-off; runoff path follows old mine access road for approx. 600' before flowing downhill to the creek .

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Irrigation, fishery, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? N/A Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Slight iron staining in the creek may be partially due to groundwater discharge to the creek. Staining is present up and down stream of the site.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	Downstream of runoff PPE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-2	SE	Runoff path PPE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-3	SE	Upgradient sample	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): XRF Analysis only because of lack of runoff flow and large distance between contaminant source and stream.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 acres

Wetlands present: Yes X , No _____, Describe: Small wetlands along Minnehaha Creek.

Carbonate rocks/soils: Yes ___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300____; 300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____; Comments

Nearest residence(ft or miles)? On-site; recreational

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3, pH	Dry	12,645	12,520	Yes	Low
WR-2	SO3, pH	Dry	17,460	17,300	Yes	Low
WR-3	SO3, pH	Dry	17,640	17,460	Yes	Low
WR-4	SO3, Veg below, pH	Dry	21,600	21,380	Yes	Low
WR-5	None	Partial	990	495	No	None

Notes and Clarifications: Vegetation below the mine is stressed approx. 1/2 acre of grass and dead trees in the runoff path.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes X , No____,
Describe: Appears to be recreational use of cabin on-site.

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments________

Evidence of recreational use on site: Yes X , No___, Describe:
Campfire rings

Accessibility - Fences, warning signs, closed roads? Gate at road approximately 300 yds from mine.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes___, No X , Comment________
Bat Habitat - Yes X , No___, Comment Adit #1

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number____, types and locations:
Adit #1

Hazardous structures: Yes X , No___, Number 5 , types and locations:
Three loadouts and two old cabins

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____,
types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes X , No____,
Number 4 , types and locations: Waste rock piles are unstable, overly steep, and eroding.

Fire and/or Explosion hazards: Yes___, No X , Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDHES/WQB, Analytical Data for Armstrong, July 12, 1977 and May 13, 1980.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Armstrong, Prepared by Daphne Digrindakis, September 2, 1982.

USGS, Geology of the Basin Quadrangle, Montana, Bulletin 1151, Author Unknown, Date Unknown.

USGS, Topographic Map, Three Brothers, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

ARMSTRONG
PA NO. 25-102

Armstrong FA# 25-102
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/15/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-102-WR-1	1750	31.3	2	3.5	4.3	470	27700 J	0.527 J	339 J	3 U	15900	43	614	NR
25-102-WR-2	2670	26.5	3	2.1 U	4.1	300	30200 J	0.422 J	181 J	3 U	14000	41	724	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25-102-WR-1	1.1	34.4	-2.2	-37	0.94	0.04	0.12	1.25	-3.43
25-102-WR-2DUP	1.12	35	-1.3	-36	0.77	0.1	0.25	3.12	-4.4
25-102-WR-2	1.1	34.4	-1.4	-36	0.72	0.09	0.29	2.81	-4.22

LEGEND
WR1 - Composite of subsamples WR1A, 1B, 2A, and 2B.
WR2 - Composite of subsamples WR3A, 3B, 4A, and 4B.
BACKGROUND - From the Red Water (25-007-SS-1).
WR2DUP - Duplicate of sample 25-102-WR-2.

XRF ANALYSIS RESULTS

ARMSTRONG
PA NO. 25-102

Mine Name: Armstrong PA# 25-102
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-102-SE-1		7934.79	3271.88	671.763		3106.05	15589.2		234.615	1238.59	130.27	286.731
25-102-SE-2		15292.7	6091.86	2577.66		959.416 *	24060.2		274.817	371.049	58.441 *	280.822
25-102-SE-3		10098.4	4369.71	838.023		1508.5	11612.6		121.097 *	519.668	253.144	259.082
25-102-SE-3-DUP		19846.8	6773.72	1287.1		1097.21	13169.6		87.9757 *	437.199	237.259	260.253
25-102-WR1-A		22559.4	6323.62	2451.33			42150		457.762	604.473	493.188 *	326.916
25-102-WR1-B		22710.6	2513.9	1491.04		412.218 *	37337.4		471.397	686.986	947.519	160.688
25-102-WR2-A		24322.9	6402.86	812.867		654.577 *	39625.5		733.614	1125.96		83.0743
25-102-WR2-B		25739.2	2067.1	1867.6		1558.74	56123.1		221.658	668.894	4355.74	127.958
25-102-WR3-A		45971.5	4134.98	1345.57		1224.1 *	46463.7		201.185 *	1134.98	2968.79	75.9277
25-102-WR3-B		25702	2540.33	1204.87		1355.74 *	60690.5		555.831	1547.08		134.672
25-102-WR4-A		18430.2	2557.98	1495.83		604.102 *	48388.5		162.737 *	909.326	408.258 *	193.496
25-102-WR4-B		24851.6	1966.95	1209.74		557.854 *	32043.6		272.753	622.696	791.414 *	101.836
25-102-WR4-SS		16830.5	6359.68	2932.44		1484.06	24833.1		267.809	486.751		280.601
25-102-WR-1-COMP		29533.5	4525.61	1904.19		422.796 *	49155.8		552.011	916.739	1097.71	152.035
25-102-WR-1-COMP-DUP		25182.3	4538.89	1543.35		377.864 *	46331.5		570.799	923.07	933.783 *	182.759
25-102-WR-2-COMP		24751.7	2435.83	1193.13		788.509 *	49543.2		330.32	1099.33	1003.29	140.222

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-102-SE-1	122.555			130.947	157.36			695.229		16.8495 *	26.702
25-102-SE-2	200.327			253.201	185.747			604.033		46.326	23.9953 *
25-102-SE-3	135.179			430.158	179.373			744.088		29.0111 *	27.0317 *
25-102-SE-3-DUP	169.257			395.158	206.778			712.667		34.9472 *	31.4094
25-102-WR1-A	189.884			6415.33	177.42		264.291	667.692			21.5969 *
25-102-WR1-B	166.277		6.32824 *	10963.2	180.654		348.646	517.476	119.68 *		35.5125 *
25-102-WR2-A	106.038		53.8046	22967.7	164.897	197.741 *	160.688 *	449.164			51.8276 *
25-102-WR2-B	162.33		8.06556 *	5880.32	195.707		128.603 *	792.317	124.927 *		28.6498 *
25-102-WR3-A	120.004			4592.34	285.614		73.2289 *	576.413			32.5411 *
25-102-WR3-B	123.271		61.0953	20573.4	172.836		248.171 *	522.586	147.883 *		38.1177 *
25-102-WR4-A	152.389			5239.51	180.209		99.2328 *	625.767			23.6714 *
25-102-WR4-B	97.8914		31.0386	14274.9	175.18		126.126 *	239.067	154.111 *		58.4144 *
25-102-WR4-SS	216.186		9.69589 *	702.657	229.841			771.871		105.909	22.0008 *
25-102-WR-1-COMP	162.461		22.7491 *	16694.3	199.128		265.164 *	481.549	164.56 *		41.8622 *
25-102-WR-1-COMP-DUP	153.154		21.2789 *	15928.9	159.319	195.063 *	247.965 *	464.766			30.3302 *
25-102-WR-2-COMP	145.795		21.8649 *	12677.1	198.714	195.737 *	121.935 *	528.014			21.3879 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

ARMSTRONG
PA NO. 25-102

AIMSS SCORESHEET

SITE NAME: ARMSTRONG MINE
PA NUMBER: 25-102

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	101.797
6		WELLS - 1 MI. x 2.5		7.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		256
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	263.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	10729404
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	110.797
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	75342
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.693
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		10
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	29544
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		250
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	450
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.393
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	16
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	24430
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**108.59**

SITE NAME: ARMSTRONG MINE
PA NUMBER: 25-102

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	200
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	250
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	16
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**40.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

STATE HEALTH DEPT. WATER QUALITY BUREAU HELENA, MONTANA 59601

STATE	MONTANA	COUNTY	LEWIS+CLARK
LAT.-LONG.	463021N 1121542W	SAMPLE LOCATION	9N 5W 29CAA
STATION CODE		ANALYSIS NUMBER	77W1442
DATE SAMPLED	07-12-77	DRAINAGE BASIN	041I -U MISSOURI
TIME SAMPLED		WATER FLOW RATE	.74CFS(M)
METHOD SAMPLED	GRAB	FLOW MEASUREMENT METHOD	GURLEY METER
SAMPLE SOURCE	STREAM	ALTITUDE OF LAND SURFACE	
WATER USE	MULTIPLE	TOTAL WELL DEPTH BELOW LS	
AQUIFER(S)		SWL ABOVE(+) OR BELOW LS	
SAMPLED BY	WQBH	SAMPLE DEPTH BELOW SURFACE	

SAMPLING SITE: MINNEHAHA CREEK NEAR MOUTH

	MG/L	MEQ/L		MG/L	MEQ/L
CALCIUM (CA)			BICARBONATE(HCO3)		
MAGNESIUM (MG)			CARBONATE (CO3)		
SODIUM (NA)			CHLORIDE (CL)		
POTASSIUM (K)			SULFATE (SO4)	20.0	0.416
IRON (FE)			FLUORIDE (F)		
MANGANESE (MN)			PHOSPHATE(PO4 AS P)		
ALUMINUM (AL)			NO3+NO2(TOT AS N)		
SUM CATIONS	0.0	0.0	SUM ANIONS	20.000	0.416

LABORATORY PH	7.00	TOT HARDNESS(MG/L-CACO3)	
FIELD WATER TEMPERATURE (C)		TOT ALKALINITY(MG/L-CACO3)	
SUM-DISS. IONS MEAS.(MG/L)		LABORATORY TURBIDITY (JTU)	
LAB CONDUCTIVITY-UMHOS-25C	106.5	SODIUM ADSORPTION RATIO	

ADDITIONAL PARAMETERS

COPPER,TR (MG/L AS CU)	.01	IRON,TR (MG/L AS FE)	< 0.05
ZINC,TR (MG/L AS ZN)	.34	MANGANESE,TR(MG/L AS MN)	< 0.01
LEAD,TR (MG/L AS PB)	< 0.05	CADMIUM, TR (MG/L AS CD)	< 0.005
SILVER, TR (MG/L AS AG)	< 0.05	ARSENIC,TR (MG/L AS AS)	< 0.001
MERCURY, TR (MG/L AS HG)	< 0.0002		

REMARKS: BOULDER BATHOLITH 0662

EXPLANATION: MG/L=MILLIGRAMS PER LITER MEQ/L=MILLIEQUIVILENTS PER LITER
ALL CONSTITUENTS DISSOLVED (DISS) EXCEPT AS NOTED. TOT=TOTAL SUSP=SUSPENDED
(M)= MEASURED(R)=REPORTED (E)=ESTIMATED M=METERS TR=TOTAL RECOVERABLE

SAMPLE NO 01 SAMPLER DP HANDLING 3201 ANALYST ME LAB WQBH
COMPLETED 09-16-77 COMPUTER RUN 09/27/77 DATA 0975/PROG 0876 FUND 0662

		CA	MG	NA	K	CL	SO4	HCO3	CO3	NO3
STND DEV. ION BALANCE	4.47									
SEGMENT	MPDES	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0

CALC. MEQ/L= INSUFFICIENT DATA 77W1442

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TATE HEALTH DEPT.          WATER QUALITY BUREAU          HELENA, MONTANA  59601

          STATE   MONTANA                                 COUNTY   LEWIS+CLARK
     LAT.-LONG.   463021N 1121542W               SAMPLE LOCATION   9N  5W 29CAA
   STATION CODE                                  ANALYSIS NUMBER   80W0693
   DATE SAMPLED   05-13-80                        DRAINAGE BASIN   0411 -U MISSOURI
   TIME SAMPLED   1115                           WATER FLOW RATE      14.  CFS(E)
 ETHOD SAMPLED   GRAB                 FLOW MEASUREMENT METHOD   NOT MEASURED
  SAMPLE SOURCE   STREAM                 ALTITUDE OF LAND SURFACE
      WATER USE   MULTIPLE              TOTAL WELL DEPTH BELOW LS
     AQUIFER(S)                         SWL ABOVE(+) OR BELOW LS
     SAMPLED BY   WQBH                SAMPLE DEPTH BELOW SURFACE

        SAMPLING SITE: MINNEHAHA CREEK JUST ABOVE MOUTH

                      MG/L      MEQ/L                                   MG/L      MEQ/L
  CALCIUM (CA)                              BICARBONATE(HCO3)
MAGNESIUM (MG)                                CARBONATE (CO3)
   SODIUM (NA)                                 CHLORIDE  (CL)
POTASSIUM  (K)                                  SULFATE (SO4)
                                               FLUORIDE   (F)
                                           PHOSPHATE(PO4 AS P)
                                            NO3+NO2 (TOT AS N)

                     ______     ______                              ______     ______
   SUM CATIONS        0.0        0.0             SUM ANIONS          0.0       0.000

               LABORATORY PH                     TOT HARDNESS(MG/L-CACO3)
FIELD WATER TEMPERATURE (C)                    TOT ALKALINITY(MG/L-CACO3)
 SUM-DISS. IONS MEAS.(MG/L)                    LABORATORY TURBIDITY (NTU)
 LAB CONDUCTIVITY-UMHOS-25C                       SODIUM ADSORPTION RATIO

                    A D D I T I O N A L   P A R A M E T E R S
   COPPER,TR (MG/L AS CU)       .02           ZINC,TR (MG/L AS ZN)        .36
     IRON,TR (MG/L AS FE)       .17     MANGANESE,TR(MG/L AS MN)        .02


REMARKS:  TEN MILE MINE DRAIN STUDY

EXPLANATION: MG/L=MILLIGRAMS PER LITER  MEQ/L=MILLIEQUIVILENTS PER LITER
ALL CONSTITUENTS DISSOLVED (DISS) EXCEPT AS NOTED. TOT=TOTAL SUSP=SUSPENDED
(M)= MEASURED(R)=REPORTED (E)=ESTIMATED M=METERS TR=TOTAL RECOVERABLE
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
SAMPLE NO 03       SAMPLER  GLI    HANDLING 1100   ANALYST           LAB  WQBH
COMPLETED             COMPUTER RUN 08/15/80  DATA 0975/PROG 0876 FUND 6053
STND DEV. ION BALANCE  0.00      CA    MG    NA     K    CL   SO4  HCO3  CO3   NO3
SEGMENT        MPDES             0.0   0.0   0.0   0.0  33.3  33.3  0.0  33.3   0.0
CALC. MEQ/L= INSUFFICIENT DATA                                             80W0693
```

25-102, #22: Armstrong site from top, facing east

25-102, #23: Adit #2 and Adit #3

25-102, #24: Adit #4

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BEATRICE PA#: 25-103

Date: July 13, 1993 Time: 0830-1430

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool; overcast; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #28: SW-3 and SE-3 locations; #29: SW-4 and SE-4 locations; #30: Red seep from WR-2; #31: WR-2 from below; #32: WR-2 from above; #33: Seepage from Adit #2; #34: WR-1 from below; #35: Red seep from WR-1; #36: WR-1 from top; #37: Adit #1, SW-2 location; #38: SW-5 and SE-5 locations. Roll #2: #1: WR-5; #2: SW-1 and SE-1 locations; #3: Collapsed adit and AMD; #4: WR-4. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Very turbid water; high pyrite content in all dumps; streambed is stained red.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove or isolate dumps from stream bed. Close adits and possibly treat discharge or route around dumps. Close open shaft.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BEATRICE PA#: 25-103

Legal Description: T 8N ;R 6W ;Sec. 1 , NW1/4 NW1/4 ___1/4

County: LEWIS & CLARK Mining District: RIMINI

Latitude: N 46° 28' 53" Longitude: W 112° 18' 10"

Primary Drainage Basin and Code: Ten Mile Creek/10030101
Secondary Drainage Basin: Minnehaha Creek

USGS Quadrangle map name(s): Three Brothers

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Helena National Forest.

Relationship to other mines/sites in the area/district: Located near an active Pegasus Gold Corporation mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6800' , Slope 10° , Aspect Northwest

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.35 acres.
Dimensions: Numerous waste rock dumps; site is 900 feet x 100 feet.

Predominant vegetation types: Lodgepole pine, fir, beargrass

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by Butte quartz monzonite with vein deposits in fault zone.

Mining/milling history, ore type/tenor, host rock, gangue: History is unavailable; possibly mined as early as 1903. Mined for siliceous gold in quartz veins; host rock is Butte quartz monzonite; minerals are pyrite, argentiferous galena, sphalerite, and chalcopyrite; gangue is massive gray quartz.

Mine Operation?

Shafts - Yes X, No ___, # 2, Comment 1 collapsed; 1 open

Adits - Yes X, No ___, # 4, Comment 3 collapsed; 1 open

Pits - Yes ___, No X, # ___, Comment

Placers - Yes ___, No X, # ___, Comment

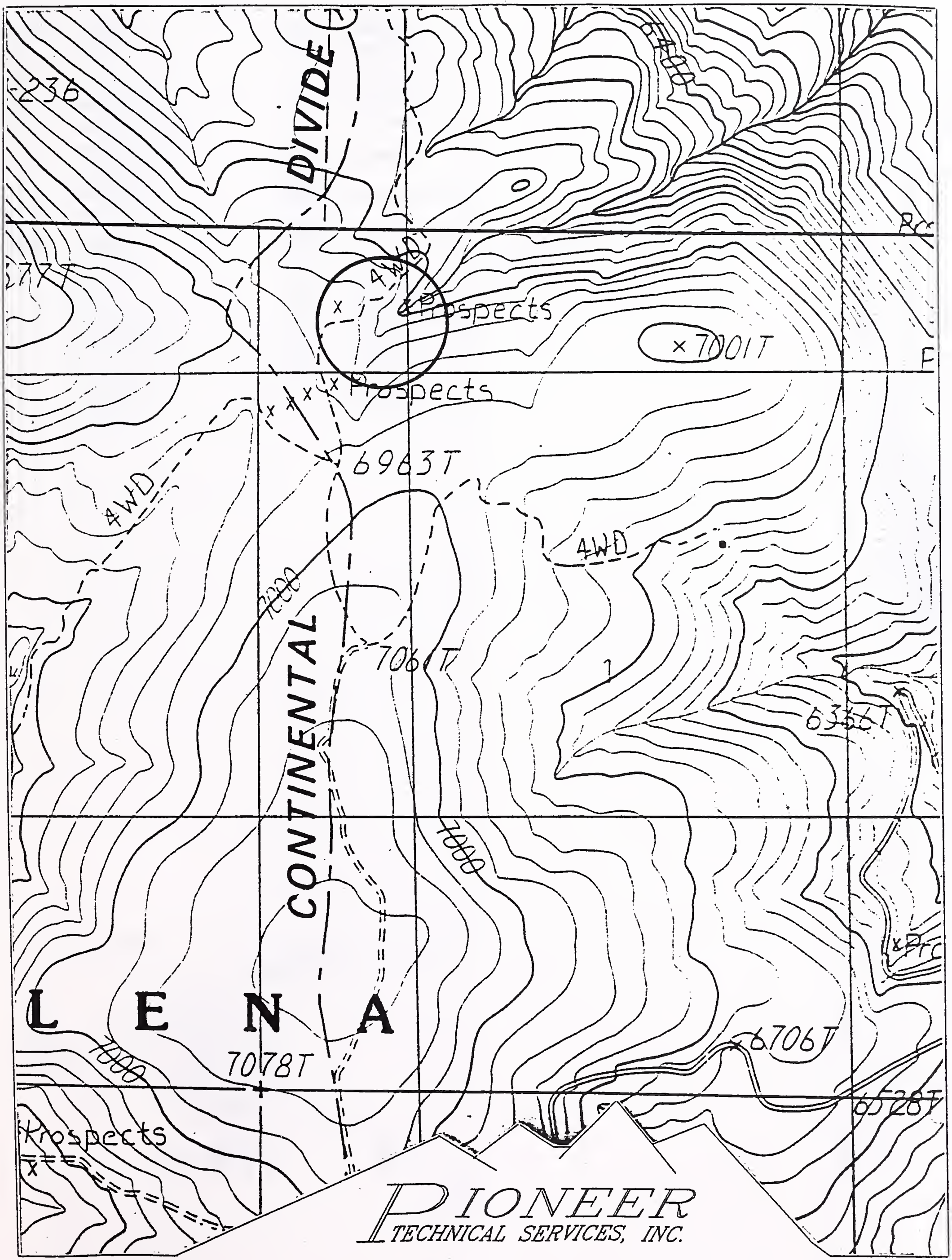
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

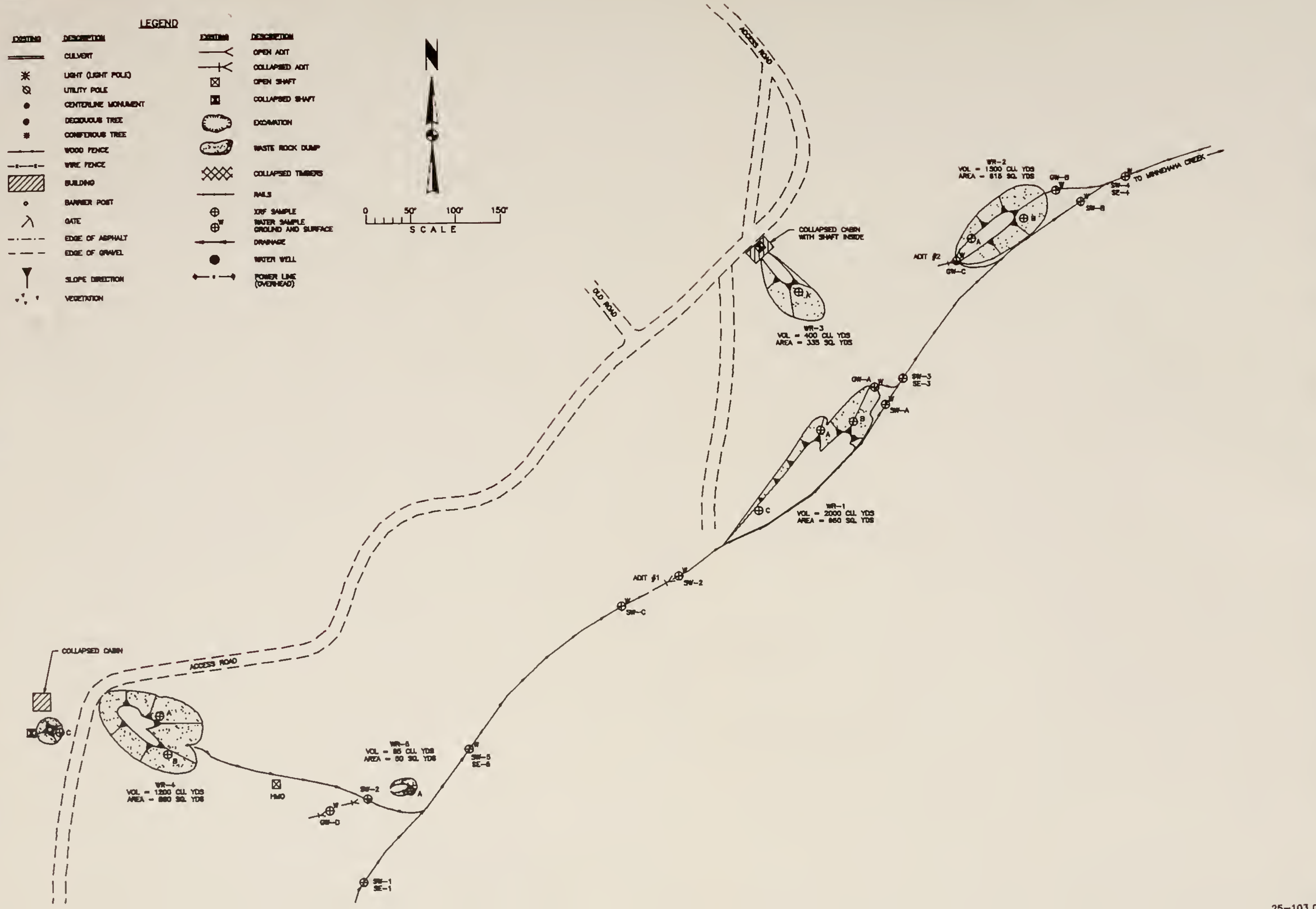
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



BEATRICE, P.A. NO. 25-103

T08N, R06W, SECTION 01
SCALE: 1" = 1000'



DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BEATRICE PA# 25-103
RIMINI DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

SHEETS

25-103.DWG

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,000	Associated with Adit #1 down in drainage; north lobe near knob	None	5.6 (D)	0.05	25-103-WR-1	07/13/93 2100	T-Metals, ABA
WR-1B	WR		Associated with Adit #1 down in drainage; east lobe near knob	None	3.5 (D)	0.05			
WR-1C	WR		Associated with Adit #1 down in drainage; north of adit on top	None	< 3.5 (D)	0.05			
WR-2A	WR	1,500	Associated with Adit #2 in drainage below WR-1; north of adit on top	None	5.1 (D)	0.05	25-103-WR-2	07/13/93 2110	T-Metals, ABA
WR-2B	WR		Associated with Adit #2 in drainage below WR-1; off end of lobe near top	None	5.4 (D)	0.05			
WR-3	WR	400	Small dump off of road above WR-1; north side off of knob	None	6.6 (D)	0.04	N/A	N/A	XRF Analysis
WR-4A	WR	1,200	Largest dump off of road above WR-1; north lobe off of east end	None	< 3.5 (D)	0.05	25-103-WR-3	07/13/93 2100	T-Metals, ABA
WR-4B	WR		Largest dump off of road above WR-1; south lobe off of east end	None	< 3.5 (D)	0.04			
WR-4C	WR		Largest dump off of road above WR-1; east of collapsed shaft	None	< 3.5 (D)	0.05			
WR-5	WR	85	Small dump below WR-4 in stream; northeast side	None	6.2 (D)	0.05	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-103-WR-1 is composite of WR-1A through -1C. 25-103-WR-2 is composite of WR-2A and -2B. 25-103-WR-3 is composite of WR-4A through -4C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 3 Identification: Adit #1, #2, and #3

Filled shafts: Yes X , No ___, Number: 1 Identification: HMO below WR-4

Seeps/Springs: Yes X , No ___, Number: ____ Identification: Adjacent to WR-4

Groundwater wells within 4 miles?: Yes X , No ___;
Number of well logs: 259

Distance to nearest well used for drinking? Great distance to the nearest well.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Abundant water on-site and shallow depth to groundwater.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-A	GW	Seepage from WR-1	1 gpm (E)	3.81	100	382	4.2	N/A	N/A	N/A	N/A	N/A
GW-B	GW	Seepage from WR-2	1 gpm (E)	6.11	160	307	4.8	N/A	N/A	N/A	N/A	N/A
GW-C	AD	Discharge from Adit #2	2 gpm (E)	6.51	100	217.8	4.2	N/A	N/A	N/A	N/A	N/A
GW-D	AD	Discharge from Adit #3	1 gpm (E)	5.06	60	327.9	7.4	N/A	N/A	N/A	N/A	N/A
SW-2	AD	Discharge from Adit #1	50 gpm (E)	4.34	270	284.6	5.1	0	N/A	25-103-SW-2	07/13/93 1000	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ____, Name(s): Unnamed tributary of Minnehaha Creek

Dry streambeds: Yes ____, No X, Name(s): ____

Other surface water: Yes X, No ___, Name(s)/Description: Adit discharge is large part of tributary flow.

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-1, -2, and -5

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 30 gpm during sampling
High Flow: 200 gpm, Average Flow: 50 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ____,
Describe: WR-1 and -2 cut by stream; adits discharge on to piles.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Minnehaha Creek has wetlands and fishery; Tenmile Creek has recreation.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No _____, Distance downstream (ft)? 1000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Turbid/sediment bedload due to dumps.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient of all dumps and discharges	5.48	60	205	NM	0	< 20 gpm (E)	25-103-SW-1	07/13/93 1010	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Upgradient of all dumps and discharges	N/A	N/A	N/A	N/A	N/A	N/A	25-103-SE-1	07/13/93 1010	T-Metals
SW-3	SW	Downstream of WR-1 and Adit #1	5.11	180	357.3	5.2	9	NM	25-103-SW-3	07/13/93 0930	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	Downstream of WR-1 and Adit #1	N/A	N/A	N/A	N/A	N/A	N/A	25-103-SE-3	07/13/93 0930	T-Metals
SW-4	SW	Downstream of WR-2 and Adit #2	5.48	160	277.0	5.1	9	NM	25-103-SW-4	07/13/93 1037	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-4	SE	Downstream of WR-2 and Adit #2	N/A	N/A	N/A	N/A	N/A	N/A	25-103-SE-4	07/13/93 1037	T-Metals
SW-5	SW	Upstream from Adit #1, down from WR-4 and -5	5.48	60	195.0	6.1	9	30 gpm (E)	25-103-SW-5	07/13/93 1230	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-5	SE	Upstream from Adit #1, down from WR-4 and -5	N/A	N/A	N/A	N/A	N/A	N/A	25-103-SE-5	07/13/93 1230	T-Metals
SW-A	SW	Water in creek below WR-1, but above WR-1 seep confluence	5.48	160	297	5.3	N/A	N/A	N/A	N/A	Field Parameters
SW-B	SW	Water in creek below WR-2, above confluence with seepage from WR-2	5.52	160	308	5.5	N/A	N/A	N/A	N/A	Field Parameters
SW-B	SW	Water in creek above Adit #1 discharge	5.45	60	209.5	6.0	N/A	N/A	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Minimal in stream valley; two acres above near WR-4.

Wetlands present: Yes___, No X, Describe:

Carbonate rocks/soils: Yes___, No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX; Sulfides; pH	Dry, except where adit flows onto	8,550	7,695	Yes	Low
WR-2	FEOX; Sulfides	Dry, except where adit flows onto	5,535	5,535	Yes	Low
WR-3	FEOX	Dry	3,015	1,206	No	Low
WR-4	FEOX; Abundant Sulfides; pH	Dry	7,740	7,740	Yes	Moderate
WR-5	FEOX	Dry	450	90	Yes	Low
SW-2	pH	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments Cabin at Armstong mine

Evidence of recreational use on site: Yes_X_, No___, Describe:
Campfire ring; hunter's arrow

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment
Wilderness Area - Yes___, No_X_, Comment
T&E Species Habitat - Yes___, No_X_, Comment
Bat Habitat - Yes___, No_X_, Comment

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:
One small open shaft (> 50' deep) in drainage below WR-4; open adit with water flowing out (Adit #1).

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:
Cabin near road

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_2_, types and locations: WR-1 and -2 are being cut by stream and are eroding into it.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Beatrice mine, Prepared by Robert Peccia & Associates, July 29, 1988.

USGS, Geology of the Basin Quadrangle, Montana, Bulletin 1151, Author Unknown, Date Unknown, pp. 99-100.

USGS, Topographic Map, Three Brothers, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

BEATRICE
PA NO. 25-103

MDSL AMRB/PIONEER 4/9/93

Beatrice PA# 25–103
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 07/13/93

SOLID MATRIX ANALYSES

Metals in soils Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25–103–SE–1	11 J	30.2	1 J	5.4	4.3	64 JX	9330	0.066 J	608	19 JX	14 J	7 UJ	76 J	NR
25–103–SE–3	33 J	22.5	2 J	8.6	3.2	207 JX	26500	0.095 J	816	9 JX	239 J	14 J	61 J	NR
25–103–SE–4	26 J	25.7	2 J	16.7	2.6	242 JX	24300	0.176 J	1430	3 UJX	183 J	8 UJ	68 J	NR
25–103–SE–5	25 J	11.4	2.4 J	5.4	3.3	127 JX	23400	0.084 J	372	5 JX	340 J	9 J	200 J	NR
25–103–WR–1	44 J	31.3	0.7 J	3.1	3.6	50.2 JX	20000	0.105 J	88.3	3 UJX	247 J	7 UJ	28 J	NR
25–103–WR–2	41 J	10.1	0.7 J	2 U	1.4 U	95.8 JX	16700	0.265 J	88.3	3 UJX	2230 J	14 J	55 J	NR
25–103–WR–3	95 J	17.7	2.8 J	4.6	2.6	342 JX	39100	0.997 J	282	5 JX	600 J	65 J	175 J	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25–103–WR–1	0.31	9.68	–0.8	–10.	0.19	0.02	0.1	0.62	–1.49
25–103–WR–2	0.89	27.8	–1.8	–29.	0.51	0.08	0.3	2.5	–4.34
25–103–WR–3	0.21	6.56	–0.8	–7.4	0.14	<0.01	0.08	0	–0.84

WATER MATRIX ANALYSES

Metals in Water Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25–103–SW–1	2.99	8.43	2.57 U	9.70 U	6.83 U	9.20	40.1	0.120	7.57 J	12.7 U	0.72 U	30.7 U	23.4 J	13.1
25–103–SW–2	1.80	8.20	2.57 U	9.70 U	6.83 U	121	1970	0.140	307 J	12.7 U	10.4 J	30.7 U	95.5 J	28.8
25–103–SW–3	1.73	7.33	3.07	9.70 U	6.83 U	175	2710	0.170	464 J	12.7 U	10.8 J	30.7 U	119 J	40.9
25–103–SW–4	1.46	7.20	2.57 U	9.70 U	6.83 U	156	2100	0.180	388 J	12.7 U	7.85 J	30.7 U	107 J	41.3
25–103–SW–5	2.13	8.63	2.57 U	9.70 U	6.83 U	14.40	139	0.170	14.1 J	12.7 U	6.16 J	30.7 U	16.3 J	13.8

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
25–103–SW–1	66	< 5.0	12	< 0.05	NR
25–103–SW–2	113	< 5.0	50	< 0.05	NR
25–103–SW–3	114	< 5.0	52	< 0.05	NR
25–103–SW–4	115	< 5.0	51	< 0.05	NR
25–103–SW–5	64	< 5.0	12	< 0.05	NR

LEGEND

SE1 – Upgradient of all dump and discharges.
SE3 – Downstream of waste rock dump 1 and adit #1.
SE4 – Downstream of waste rock dump 2 and adit #2.
SE5 – Upstream from adit #1, down from waste rock dump 4 and 5.
WR1 – Composite of subsamples WR1A through 1C.
WR2 – Composite of subsamples WR2A and 2B.
WR3 – Composite of subsamples WR4A through 4C.
BACKGROUND – From the Red Water Mine (25–007–SS–1).

SW1 – Same as sample SE1.
SW2 – Discharge from adit #1.
SW3 – Same as sample SE3.
SW4 – Same as sample SE4.
SW5 – Same as sample SE5.

XRF ANALYSIS RESULTS

BEATRICE
PA NO. 25-103

MDSL AMRB/PIONEER 4/9/93

Mine Name: Beatrice PA# 25–103
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25–103–WR1–A		25124.6	3917.69	2723.15			39665.6		62.1215 *		74.969 *	237.186
25–103–WR1–B		17291.2	8853.07	1821.06			29609		108.638 *		44.4478 *	238.965
25–103–WR1–C			4242.02	2685.62			23833.1		74.3043 *		98.1293 *	163.602
25–103–WR2–A			4385.52	2046.81		475.721 *	61703.5		376.455	385.119	105.166 *	172.414
25–103–WR2–B			2741.84	1467.76			55762.6		345.148		109.762 *	203.181
25–103–WR4–A			1734.09	977.137	118.847 *		14192.1		88.1208 *		51.1577 *	45.9808
25–103–WR4–B			9045.32	2378.92			39796.7		135.988 *			155.99
25–103–WR4–C			2916.69	1133.86			36298.7		214.305	204.551		102.815
25–103–WR–1–COMP			5566.92	2888.64			32751.1		81.2473 *		59.1045 *	209.652
25–103–WR–2–COMP			4794.87	1814.77			32762.8		133.726 *	71.3619 *		116.687
25–103–WR–3			7300.46	1662.14			23889.5		138.238 *			613.174
25–103–WR–3–COMP			5500.65	2651.95			35043.2		53.9801 *		47.8663 *	216.168
25–103–WR–5			2924.98	2098.6			36506.3		131.472 *	357.913		106.263

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25–103–WR1–A	154.587			123.359	167.242			496.49		21.8101 *	10.8611 *
25–103–WR1–B	140.955			19.8552 *	142.966			453.444		21.0424 *	18.5737 *
25–103–WR1–C	160.986		12.805 *	154.177	214.683			463.787			11.612 *
25–103–WR2–A	157.537			868.623	205.467		68.3284 *	522.562			18.2755 *
25–103–WR2–B	126.393		5.61068 *	451.646	225.976		252.258	249.568	90.0135 *		15.1604 *
25–103–WR4–A	99.0631		4.61594 *	326.043	158.046		34.5759 *	191.812			7.44461 *
25–103–WR4–B	171.353		17.3513 *	170.002	200.059			407.467	78.9425 *		8.73876 *
25–103–WR4–C	123.493		4.71519 *	1721.54	183.161		146.101 *	252.996			26.6753 *
25–103–WR–1–COMP	190.778		5.39513 *	97.3645	179.111			482.77			17.487 *
25–103–WR–2–COMP	162.063		14.2516 *	1003.48	207.605		79.0974 *	352.543			19.4078 *
25–103–WR–3	139.297			108.962	128.86		56.3193 *	1006.37			8.89248 *
25–103–WR–3–COMP	180.134		6.17175 *	117.359	192.595			543.399			16.2546 *
25–103–WR–5	176.375			257.809	212.401			398.307			28.9568

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BEATRICE
PA NO. 25-103

AIMSS SCORESHEET

SITE NAME: BEATRICE
PA NUMBER: 25-103

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	4.723
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		259
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	259.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	489303

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.120
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	16
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	57344

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.030
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	45

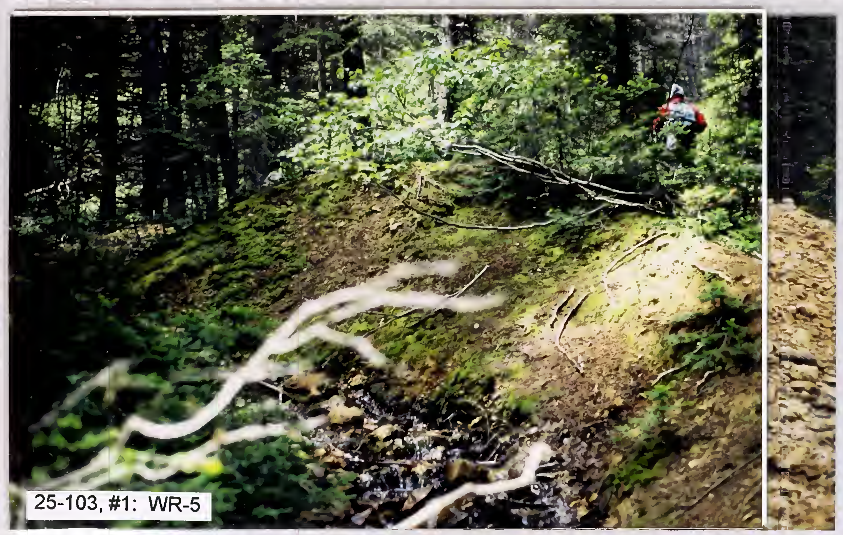
DIRECT CONTACT PATHWAY

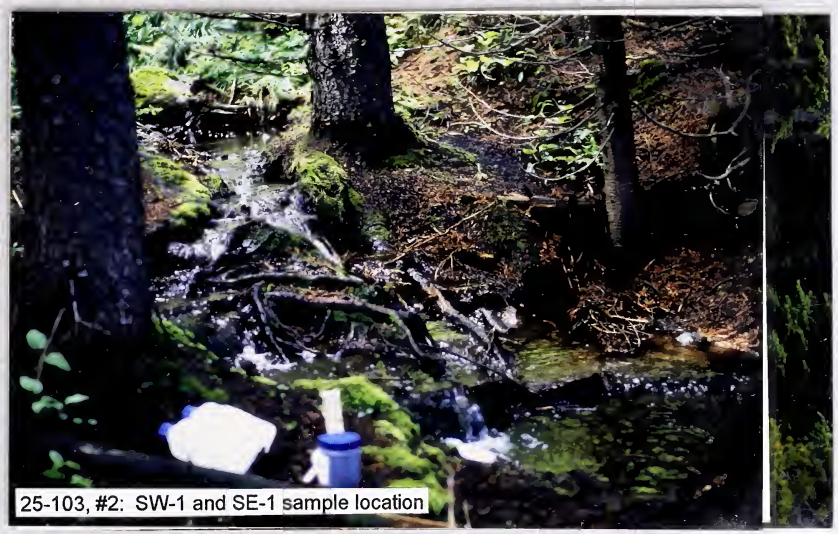
LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.027
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	24
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**5.47**

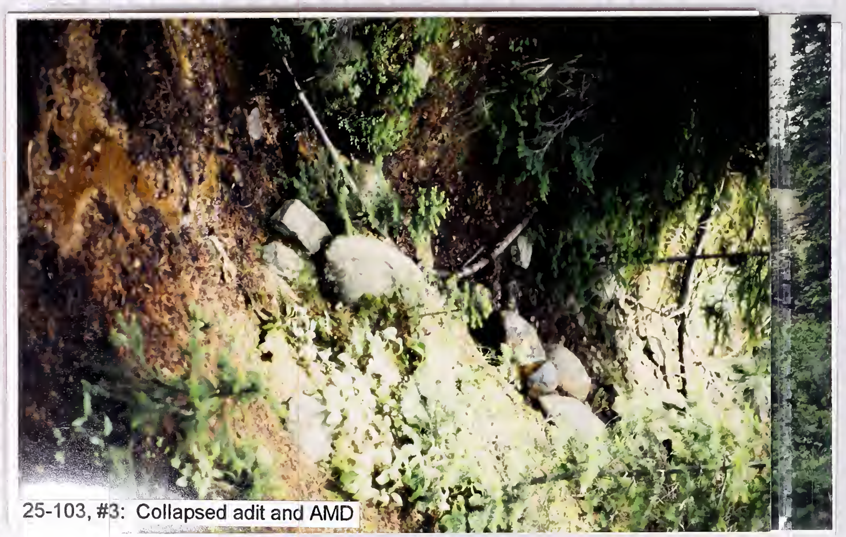
SITE NAME: BEATRICE
PA NUMBER: 25-103

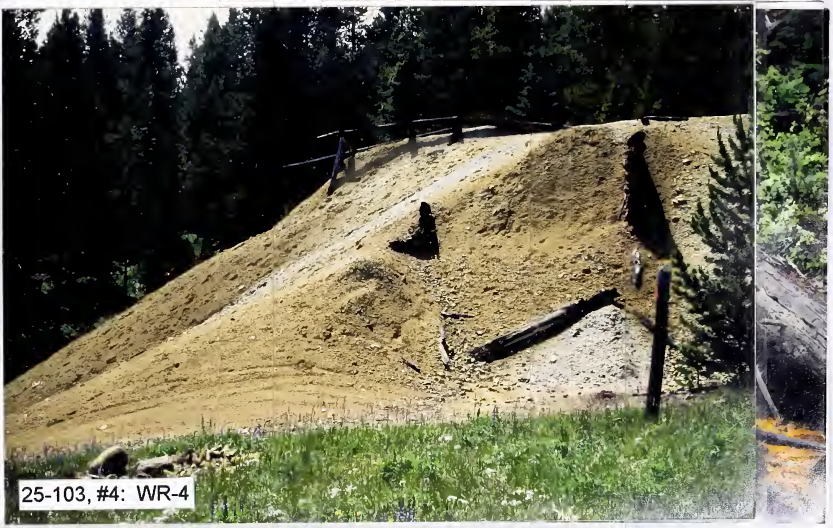
SITE SAFETY

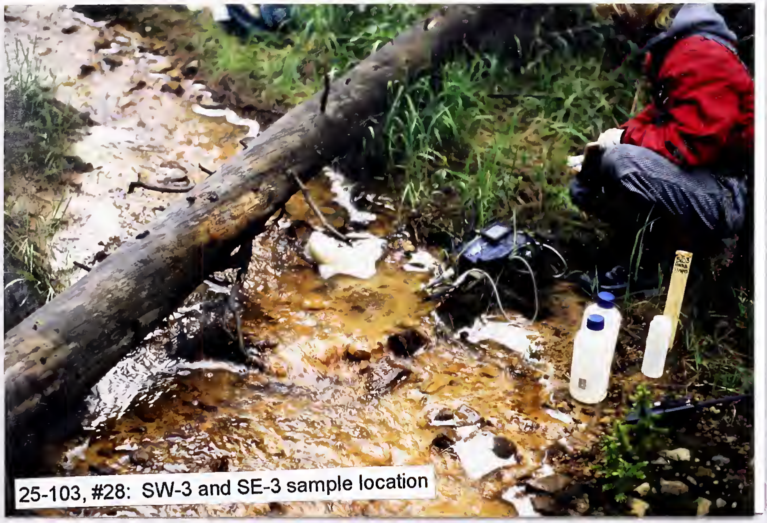
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	190
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**22.80**


25-103, #1: WR-5

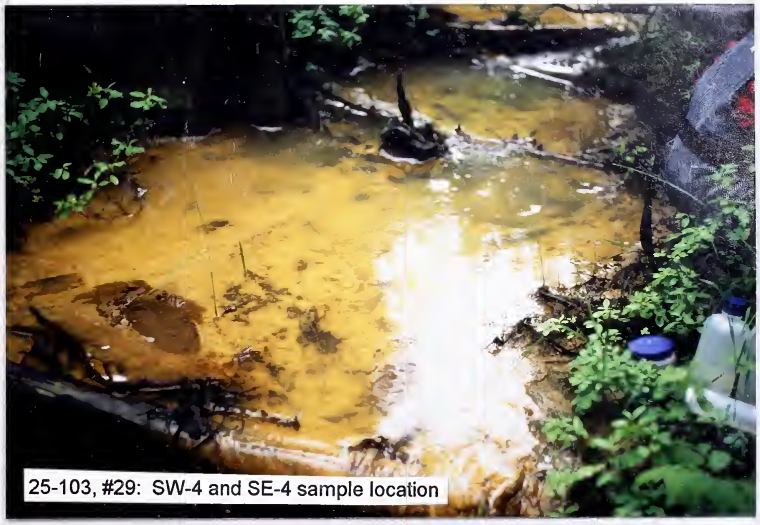

25-103, #2: SW-1 and SE-1 sample location


25-103, #3: Collapsed adit and AMD

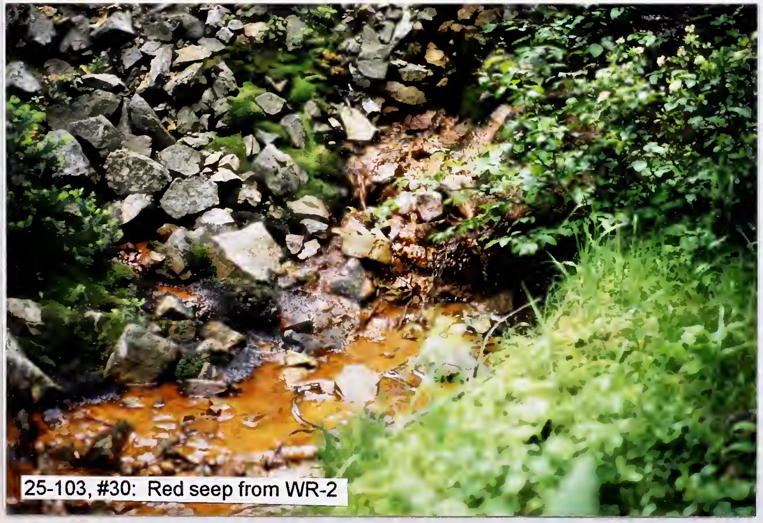

25-103, #4: WR-4



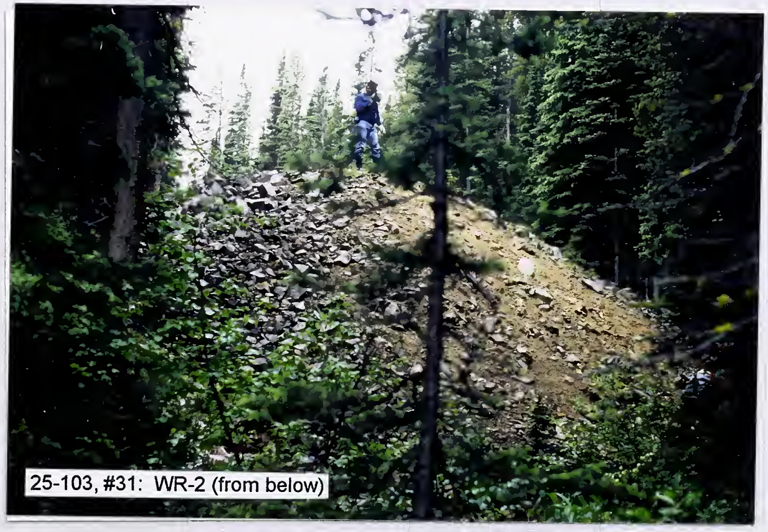
25-103, #28: SW-3 and SE-3 sample location



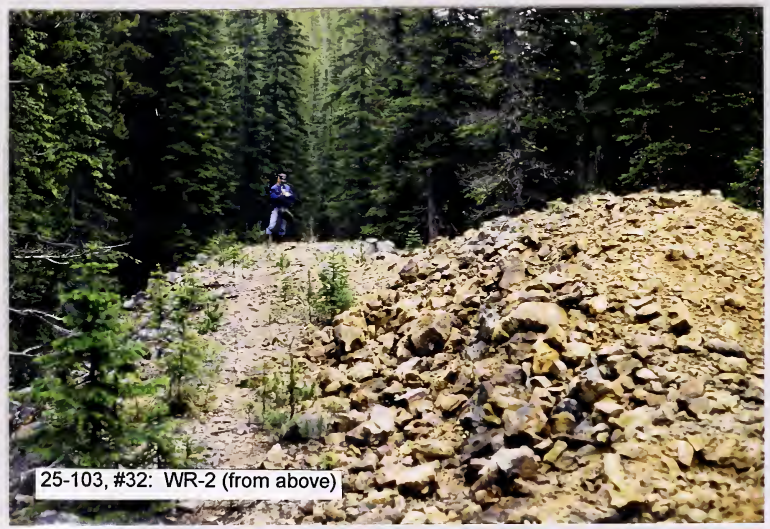
25-103, #29: SW-4 and SE-4 sample location



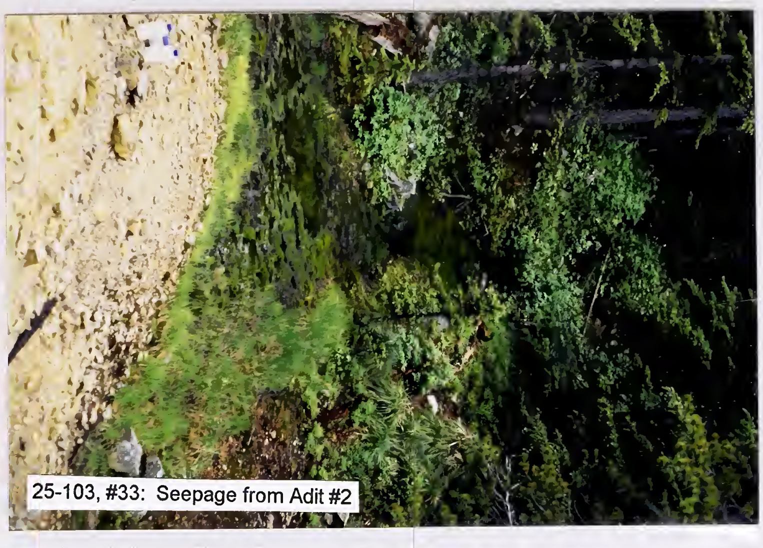
25-103, #30: Red seep from WR-2



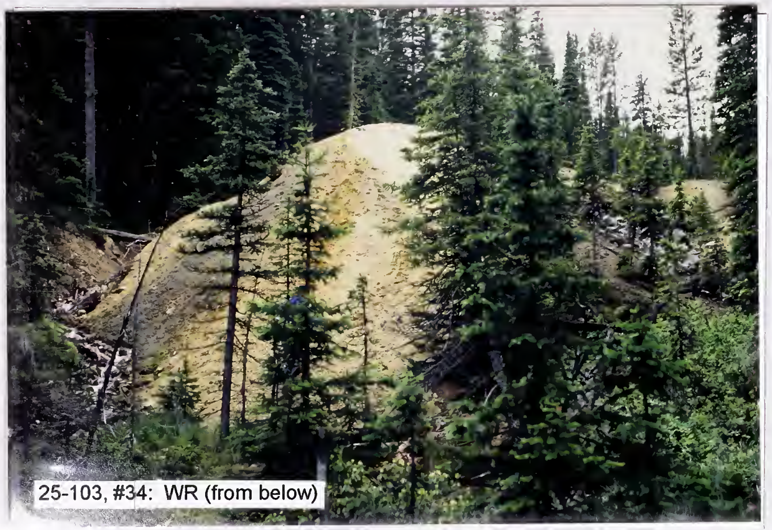
25-103, #31: WR-2 (from below)



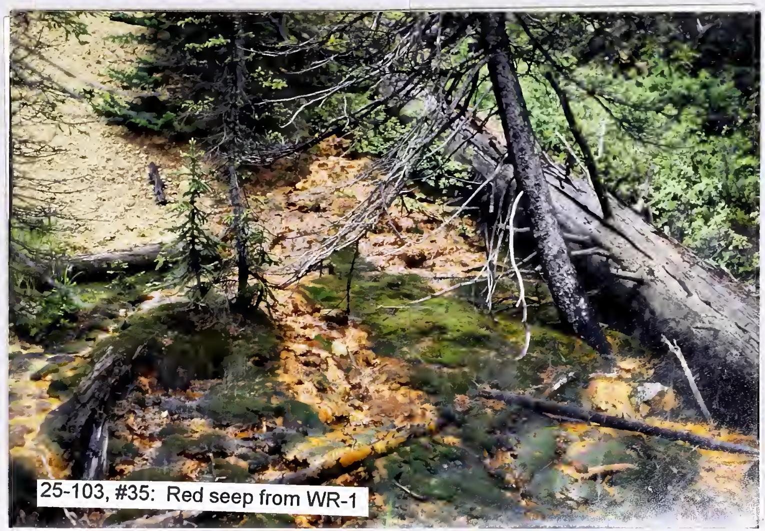
25-103, #32: WR-2 (from above)



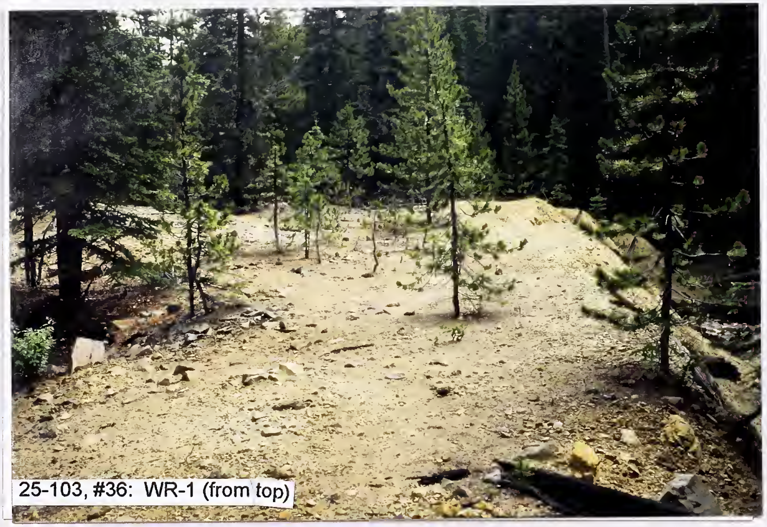
25-103, #33: Seepage from Adit #2



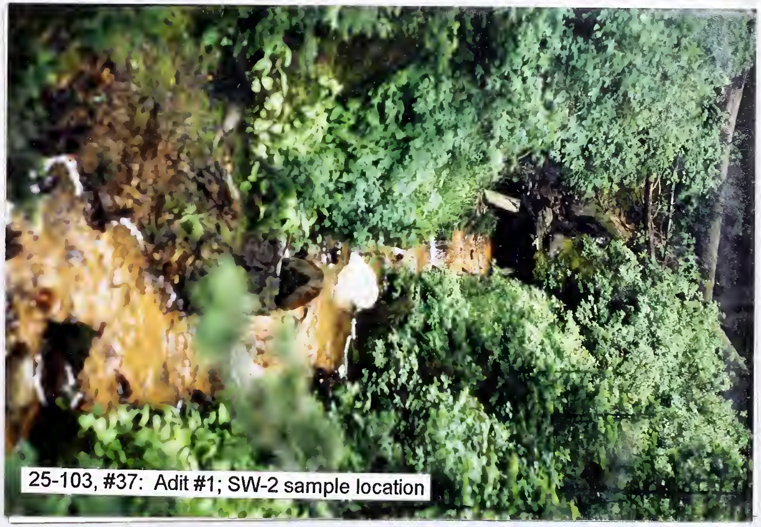
25-103, #34: WR (from below)



25-103, #35: Red seep from WR-1



25-103, #36: WR-1 (from top)



25-103, #37: Adit #1; SW-2 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: UPPER VALLEY FORGE PA#: 25-280

Date: August 20, 1993 Time: 1415-1900

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Belanger, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Partly cloudy; warm (75°F); calm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #15: WR-6; #16: WR-7; #17: Adit discharge at WR-7; #18: WR-2; #19: Mine waste washed from WR-2 and associated stressed vegetation; #20: Eroded mine wastes from WR-1 and possibly minimal mill tailings content; #21: WR-1; #22: WR-1 and possible mill structure.
Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): NW SE Sec. 33 (25-280) and SE NE Sec. 33 (25-282) were combined for sampling purposes and renamed the Upper Valley Forge Mine (25-280). All samples were submitted under 25-280.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate or remove waste rock from the drainages. Study additional water treatment requirements. Grade, amend and revegetate dumps. Study possible interconnect with Lower Valley Forge/Susie Mine for possible methods to eliminate discharge at the lower site.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): UPPER VALLEY FORGE **PA#:** 25-280

Legal Description: **T** 9N **;R** 5W **;Sec.** 33 , SW**1/4** NE**1/4** ___**1/4**
Sec. 33 , NE**1/4** SW**1/4** ___**1/4**

County: LEWIS AND CLARK **Mining District:** RIMINI

Latitude: N 46° 29' 30" **Longitude:** W 112° 14' 28"

Primary Drainage Basin and Code: Tenmile Creek/10030101
Secondary Drainage Basin: Unnamed Tributary to Tenmile Creek

USGS Quadrangle map name(s): Chessman Reservoir

Mine Type/Commodities: Hardrock/Gold, Silver, Lead

Activity Status: **Active**___, **Inactive/Exploration**___, **Abandoned** X .

Ownership status: Known YX **N**__; **private/public?** Public
Owner, Agent, or Contact (Include address and phone when available): Seattle First National Bank, Box 3586, Seattle, WA 98124.

Relationship to other mines/sites in the area/district: Underground workings are apparently connected with the Valley Forge/Susie Patent (25-008) in Rimini.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? No reclamation has occurred and no evidence of recent exploration activity.

General site features: Elevation 5800'-6000' , **Slope** 5°-35° ,
Aspect West

Land use: Mining___, **Recreational** X , **Residential**___, **Urban**___,
Agricultural___, **Other(Specify)**___

Area of disturbed/unvegetated lands? approx. 17 **acres.**
Dimensions: Site dimensions are 1,180 feet x 560 feet, lower; 460 feet x 175 feet, upper.

Predominant vegetation types: Douglas fir, spruce, grouse whortleberry, pine grass

Access: roads - good___, **poor**___, **4wd** X , **trail**___.
Other logistical considerations (proximity to other sites). Located within USFS road closure area; temporary access permit required to drive into site.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 17 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the south and north sides of an unnamed tributary to Tenmile Creek. Water flows west and then south through the site. The tributary flows into Tenmile Creek approx. 1/2 mile below the site. The site is underlain by Butte quartz monzonite.

Mining/milling history, ore type/tenor, host rock, gangue: Production from 1906 to 1948 was 29,178 tons of ore. Deposit type is auriferous silver-lead deposits enclosed in Butte quartz monzonite. Principal ore mineral is galena, accompanied by sphalerite and rare chalcopyrite with rocks identified as quartz-tourmaline or possibly hornblende; possible early carbonate ore. Gangue present later was quartz.

Mine Operation?
Shafts - Yes X, No ___, # 3, Comment 2 collapsed; 1 open
Adits - Yes X, No ___, # 10, Comment All collapsed
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: Possible mill building on property, but no tailings were identified; literature does not mention a mill.

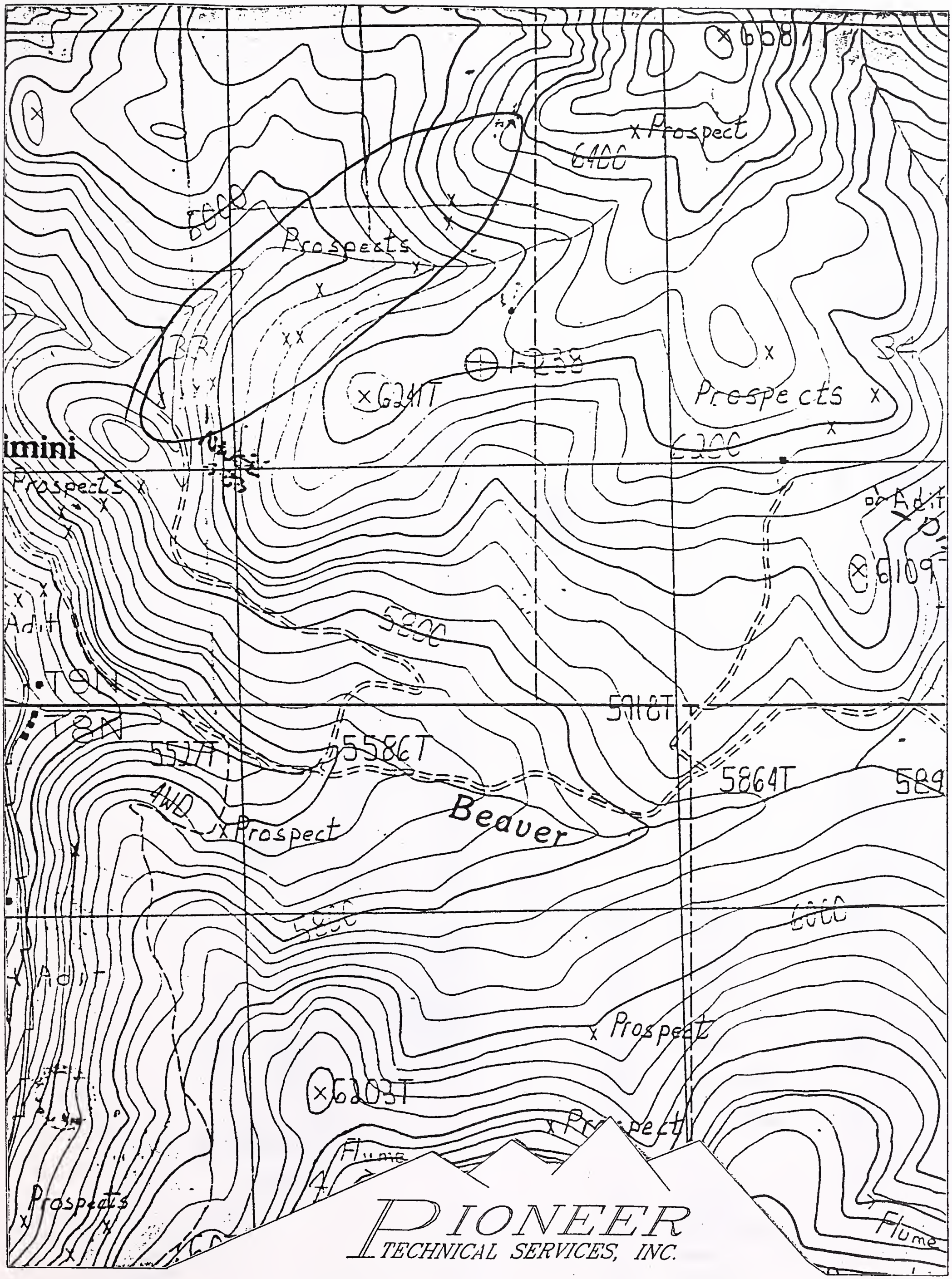
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: No information available.

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
No information available.

Montana Bureau of Mines and Geology
Water Well Log Data

10/29/1993

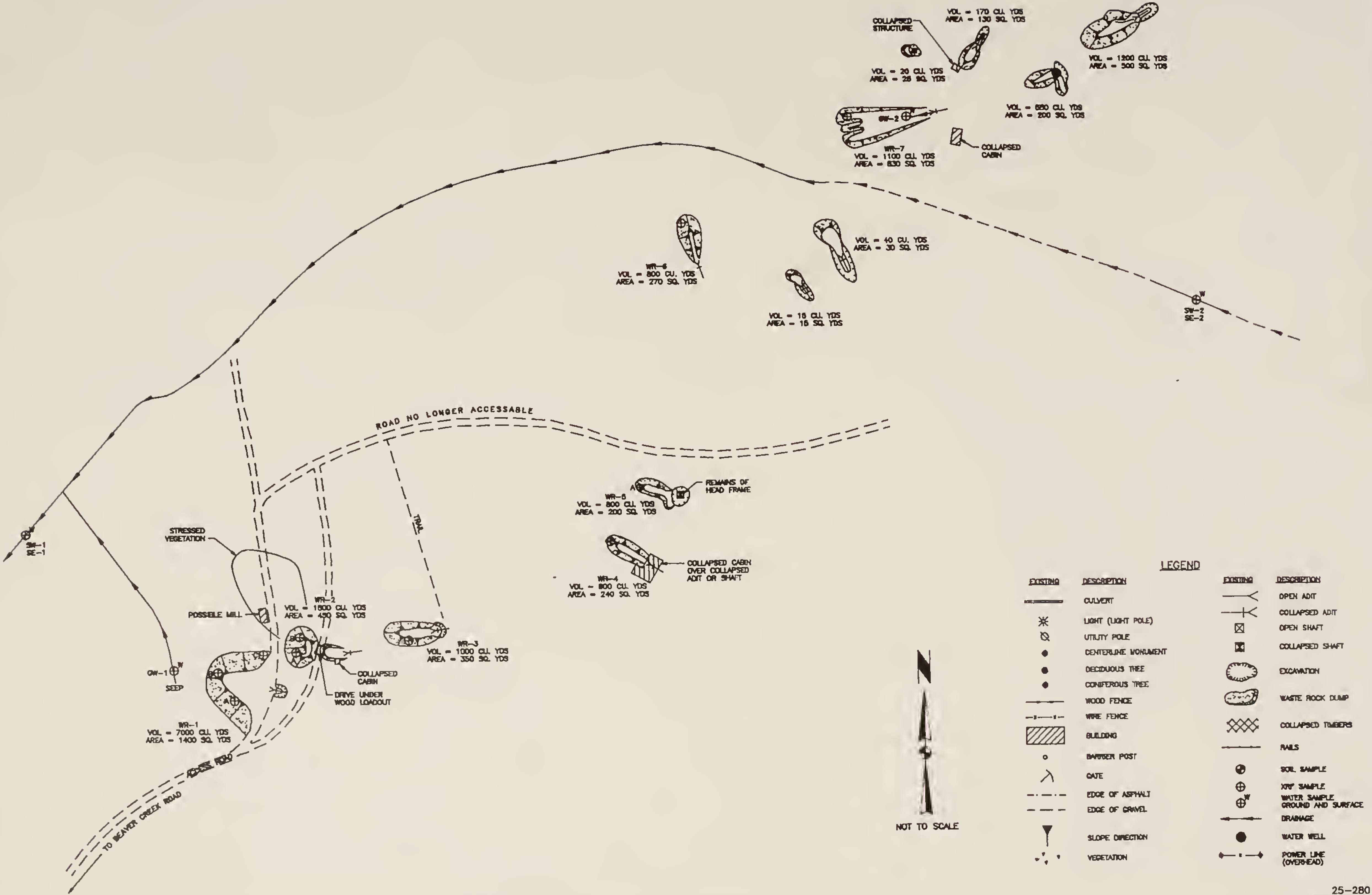
Well No.	Location	Depth	Yield	Static Water Level
M:123817	08N 05W 04 BA	120.0	30.0	35.00
M:59172	09N 05W 29	208.0	3.0	40.00
M:59173	09N 05W 29 DD	278.0	20.0	166.00
M:59174	09N 05W 32	62.0	30.0	7.00
M:59175	09N 05W 32 CC	25.0	20.0	0.00
M:59176	09N 05W 32 DAA	29.0	24.0	16.00
M:59177	09N 05W 33	63.0	0.0	10.00
M:131277	09N 05W 33	100.0	12.0	39.00
M:59178	09N 05W 33	35.0	30.0	0.00
M:59180	09N 05W 33	26.0	15.0	6.00
M:59179	09N 05W 33	44.0	20.0	10.00
M:59181	09N 05W 33 CB	80.0	20.0	15.00
M:123830	09N 05W 33 CC	160.0	15.0	25.00
M:123829	09N 05W 33 CC	60.0	20.0	20.00
M:59182	09N 05W 33 CDCC	29.0	12.0	18.00
M:131268	09N 05W 34	55.0	3.5	15.50
M:59183	09N 05W 34 AA	145.0	8.0	20.00



PIONEER
TECHNICAL SERVICES, INC.

UPPER VALLEY FORGE, P.A. NO. 25-280

T09N, R05W, SECTION 33
SCALE: 1" = 1000'



25-280.DWG

DRAWN	MWC	DATE	11/93
DESIGNED	TPR	JOB NO.	93-17
APPROVED		F.B. NO.	

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

UPPER VALLEY FORGE PA# 25-280 & 282
RIMINI DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): No tailings were found below possible mill.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)[*]	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	7,000	South of possible mill building; southwest side near top	None	< 3.5 (D)	NM	25-280-WR-1	08/20/93 2130	T-Metals, ABA
WR-1B	WR		South of possible mill building; west end of lobe near top	None	4.4 (D)	NM			
WR-IC	WR		South of possible mill building; northeast corner near bottom	None	< 3.5 (D)	NM			
WR-2A	WR	1,800	Southeast of possible mill building; south end near top	None	< 3.5 (D)	0.04			
WR-2B	WR		Southeast of possible mill building; north end near top	None	< 3.5 (D)	0.04			
WR-3	WR	1,000	East of possible mill building; south side of dump	None	< 3.5 (D)	0.04			
WR-4	WR	600	Waste rock with collapsed cabin; north end of dump	None	6.0 (D)	0.035	25-280-WR-2	08/20/93 213[illegible]	T-Metals, ABA
WR-5	WR	500	Waste rock with collapsed headframe; east end of lobe off top	None	< 3.5 (D)	0.05			
WR-6	WR	800	South side of stream; eastern most in group of three	None	< 3.5 (D)	0.03	25-280-WR-3	08/20/93 2140	T-Metals, ABA
WR-7	WR	1,100	Dump associated with discharging adit; west end	None	4.8 (D)	0.04			

[*] D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 25-280-WR-1 is composite of WR-1A through -1C, WR-2A and -2B, and WR-3. 25-280-WR-2 is composite of WR-4 and WR-5. 25-280-WR-3 is grab of WR-6.
NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No ___, Number: 1 Identification: WR-7, sampled as GW-2

Filled shafts: Yes ___, No X, Number: ___ Identification: ___

Seeps/Springs: Yes X, No ___, Number: 1 Identification: Below WR-1, sampled as GW-1

Groundwater wells within 5 miles?: Yes X, No ___;
Number of well logs: 259

Distance to nearest well used for drinking? Approx. 1/3 mile in Rimini

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable X, Possible ___, Unlikely ___.
Highly contaminated mine wastes probably in contact with shallow alluvial groundwater.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	SP	Seep below WR-1	< 1 gpm (E)	2.66	2720	559	18.6	0	N/A	25-280-GW-1	08/20/93 1650	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	AD	Adit discharge at WR-7	0	5.7	560	80	19.4	NM	N/A	N/A	N/A	Field Parameters

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No lab sample was submitted for GW-2 because adit was not flowing. NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Unnamed tributary to Tenmile Creek; water begins to flow in creek about 1/2 way through the site.

Dry streambeds: Yes X, No ___, Name(s): Small unnamed tributary to Tenmile Creek

Other surface water: Yes ___, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-1 and WR-7

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? .033 cfs
High Flow: 1.0 cfs, Average Flow: < 0.1 cfs

Distance between waste source(s) and nearest surface water body (ft)? WR-1 and WR-7 are both within 50 feet of the stream channels.

Surface water draining onto or through waste sources: Yes ___, No X,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agriculture, fishery, wetlands, residential, irrigation, and possible recreation.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? >1000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Waste rock has eroded from dumps (primarily WR-1, WR-2, and WR-3) washed into drainage.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Approx. 120 feet downgradient of WR-1, below confluence with seep	6.43	345	152	15.8	< 0.005	15 gpm (E)	25-280-SW-1	08/20/93 1645	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Approx. 120 feet downgradient of WR-1, below confluence with seep	N/A	N/A	N/A	N/A	N/A	N/A	25-280-SE-1	08/20/93 1645	T-Metals
SW-2	SW	Upgradient of WR-1 approx. 200 yards	5.90	200	356	16.0	55	1 gpm (E)	25-280-SW-2	08/20/93 1630	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upgradient of WR-1 approx. 200 yards	N/A	N/A	N/A	N/A	N/A	N/A	25-280-SE-2	08/20/93 1630	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 5 to 10 acres

Wetlands present: Yes X , No ___, Describe: Small wetlands area in the drainage below WR-1 and WR-2.

Carbonate rocks/soils: Yes ___, No X , Describe: None observed although some mention of carbonate rocks in the geology literature.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300 X ; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? Approx. 1/3 mile in Rimini

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; FEOX; Low pH	Partial	12,600	12,600	Yes	Low
WR-2	SO3; FEOX; Low pH	Dry	4,050	4,050	Yes	Low
WR-3	SO3; FEOX; Low pH	Dry	4,050	3,150	Yes	Low
WR-4	SO3; FEOX; Low pH	Dry	2,160	2,160	Yes	Low
WR-5	SO3; FEOX; Low pH	Partial	1,800	1,800	Yes	Low
WR-6	SO3; FEOX; Low pH	Partial	2,430	2,430	Yes	Low
WR-7	FEOX	Partial	7,470	5,976	Yes	Low
GW-1	FEOX; pH	N/A	N/A	N/A	N/A	N/A
GW-2	FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_, Describe:_______

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments_______

Evidence of recreational use on site: Yes_X_, No___, Describe: Evidence of camping - campfire ring.

Accessibility - Fences, warning signs, closed roads? Difficult; road closure area

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment_______
Wilderness Area - Yes___, No_X_, Comment_______
T&E Species Habitat - Yes_X_, No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No_X_, Comment_______

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Shaft located above WR-7

Hazardous structures: Yes_X_, No___, Number_3_, types and locations: Possible mill structure, loadout, and standing cabin

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:_______

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_3_, types and locations: WR-1, WR-2, and WR-3 are badly eroded.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:_______

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for NW SE Section 33 and SE NE Section 33, Prepared by Robert Peccia and Associates, July 27, 1988.

Robert Peccia and Associates, An Assessment of the Abandoned Mine Impacts in the Rimini Mining District, Prepared for the Montana Department of State Lands, January 1986.

USGS, Topographic Map, Chessman Reservoir, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

UPPER VALLEY FORGE
PA NO. 25-280/25-282

Upper Valley Forge PA# 25−280 and 25−282
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 08/20/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−280−SE−1	6340	38.3 J	29 J	17.9 J	6.32	414	28100	0.192	4040 J	3.95 U	2150	31.1	1610 J	NR
25−280−SE−2	92.6	37.7 J	2.7 J	3.37 J	7.25	14.3	9160	0.030 U	412 J	4.63	98.6	6.41 U	233 J	NR
25−280−WR−1	27200	8.13 J	5.7 J	2.2 J	2.48	134	30900	0.477	575 J	2.47 U	7360	88.2	685 J	NR
25−280−WR−2	5380	16.5 J	0.5 U	1.94 J	3.35	222	21200	0.386	28.7 J	2.38 U	8080	80.1	287 J	NR
25−280−WR−3	121000	1.82 J	1.7 J	3.81 J	1.33 U	645	108000	0.691	7.86 J	2.47 U	48700	826	171 J	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
25−280−WR−1	1.82	56.9	4.25	−52.	0.86	0.4	0.56	12.5	−8.25
25−280−WR−2	2.07	64.7	−3.7	−68.	0.65	0.87	0.55	27.2	−30.9
25−280−WR−3	9.29	290	−4.6	295	<0.01	2.79	11.8	87.2	−91.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25−280−GW−1	23700 J	2.01 U	818	127	24.3 J	3710 J	184000 J	0.12 U	21700	112	2150	33.6	83300	381
25−280−SW−1	609 J	13.3	38.2	9.7 U	6.83 U	160 J	6820 J	0.12 U	1560	15.3	101	30.7 U	5320	116
25−280−SW−2	13.1 J	24.5	2.57 U	9.7 U	6.83 U	1.55 U	72.6 J	0.12 U	7.8	12.7 U	2.07	30.7 U	47.2	67.5

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested; ND − No Data

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
25−280−GW−1	2310	ND	1330	< 0.05	< 0.00
25−280−SW−1	235	< 5.0	134	< 0.05	< 0.00
25−280−SW−2	138	< 5.0	28	< 0.05	NR

LEGEND

SE1 − Approx. 120' downgradient of waste rock dump 1. below confluence with seep.
SE2 − Upgradient of site.
WR1 − Composite of subsamples WR1A, 1B, 1C, 2A, 2B, and 3.
WR2 − Composite of subsamples WR4 and 5.
WR3 − Sample of the WR6 subsample.
BACKGROUND − From the Red Water Mine (25−007−SS−1).
GW1 −
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.

XRF ANALYSIS RESULTS

UPPER VALLEY FORGE
PA NO. 25-280/25-282

Mine Name: Upper Valley Forge PA# 25-280 & 25-282
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-280-WR1-A		17541.1	1363.62	846.246			93194.8	916.662 *	200.291 *	431.232	107467	28.0697 *
25-280-WR1-A-DUP		17245.2	1322.82	836.542			93570	509.677 *	212.175 *	427.645	108204	28.7826 *
25-280-WR1-B		14716.2	19772.5	2333.42		5207.27	44958.8		79.8144 *	856.654	554.223	345.32
25-280-WR1-C		15110.7	26663.5	1375.77		549.848 *	66584.5		579.298	996.724	29209	94.51
25-280-WR2-A		17585.6	2763.2	990.61		446.223 *	43095.4	512.288 *		117.47 *	14849.6	268.276
25-280-WR2-B		23939.7	9526.55	1241.33		430.587 *	56452.4	488.54 *	388.16	2718.57	30597.7	101.416
25-280-WR-1-COMP		15481.7	6162.86	982.648		628.809 *	61673.7	395.743 *	203.073	712.477	45536.2	124.084
25-280-WR-2-COMP		13882	4299.52	1892.48			47953.8	313.583 *	159.035 *	578.119	6306.32	282.449
25-280-WR-3		20088.9	1454.75	831.296			79896.5	419.694 *	309.676	314.871	86062.4	71.4885
25-280-WR-4		21693.1	5103.23	2533.78		609.983 *	49661.8	374.523 *	105.903 *	513.894	2171.97	278.446
25-280-WR-5		9447.89	4784.65	1304.26		492.19 *	50140	341.609 *	182.854	554.087	8754.4	343.075
25-280-WR-6		21799.1	1669.69	549.304		541.13 *	91887.6	1045.66 *	501.638	177.462	102477	38.9621 *
25-280-WR-7		20929.9	4309.8	2435.84		5358.68	41743.1		70.0367 *	815.003	3043.35	152.486

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-280-WR1-A	118.656		20.9819 *	7579.72	227.886	417.902 *	170.677 *	80.4655 *			11.64 *
25-280-WR1-A-DUP	118.243			7524.43	224.057	413.425 *	215.406 *	76.1367 *			
25-280-WR1-B	172.139			358.918	158.511	173.499 *		571.248			33.8237
25-280-WR1-C	114.101			11350.2	172.925	226.302 *	374.18	217.106	153.582 *		
25-280-WR2-A	85.8949			3924.75	123.506						
25-280-WR2-B	123.162			10163.2	232.183		593.563	160.489	259.686 *		25.9064 *
25-280-WR-1-COMP	128.912			6865.71	189.019		385.045	136.08	172.14 *		21.0325 *
25-280-WR-2-COMP	153.599			3172.78	139.167		247.599	306.621			23.0011 *
25-280-WR-3	121.943			12567.9	233.76		589.893	49.3228 *	229.926 *		26.5675 *
25-280-WR-4	236.574		6.72313 *	2282.12	207.605		142.345 *	443.047			31.3698 *
25-280-WR-5	176.536		10.8846 *	3812.28	113.879	213.336 *	261.272	241.247	166.815 *		31.2358 *
25-280-WR-6	72.4787	112.286 *		15898.2	161.699		826.638		295.75 *		19.878 *
25-280-WR-7	181.011			876.111	212.863			409.928			30.0713

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

UPPER VALLEY FORGE
PA NO. 25-280/25-282

AIMSS SCORESHEET

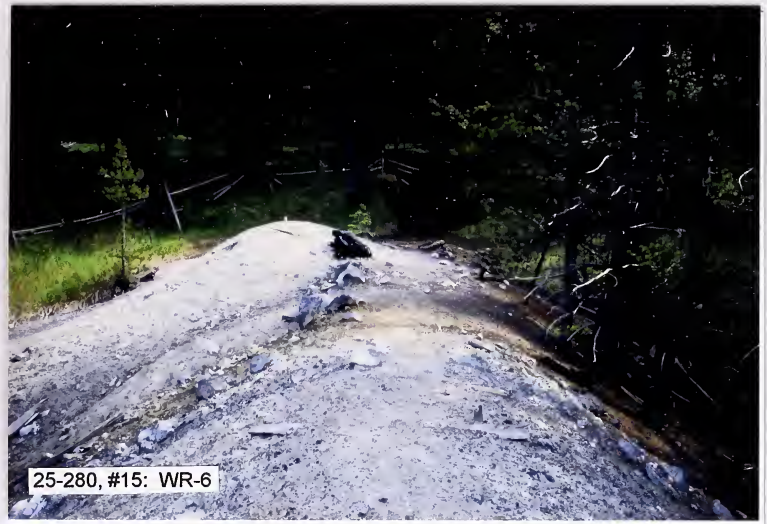
SITE NAME: UPPER VALLEY FORGE
PA NUMBER: 25-280

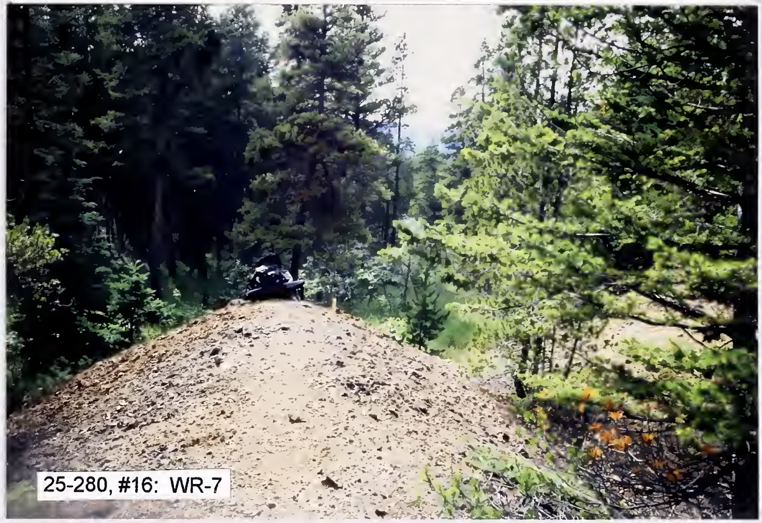
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	55.078
6	GW - TARGETS	WELLS - 1 MI. x 2.5		42.5
7		WELLS - 1 TO 4 MI		242
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	289.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	6378032
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	600
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	56.843
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	24
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	818539
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.895
29	AIR - TARGETS	POPULATION - 4 MILES		100
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	110
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	20845
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.836
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	17
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	3121
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**72.21**

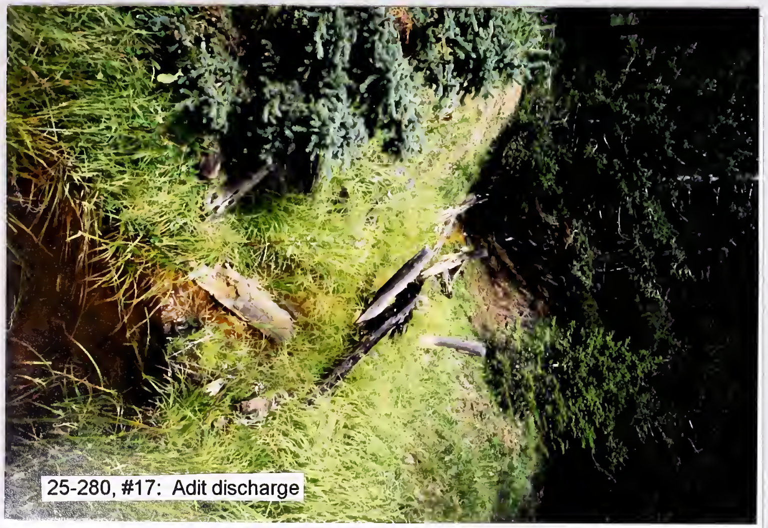
			SITE NAME:	UPPER VALLEY FORGE
			PA NUMBER:	25-280

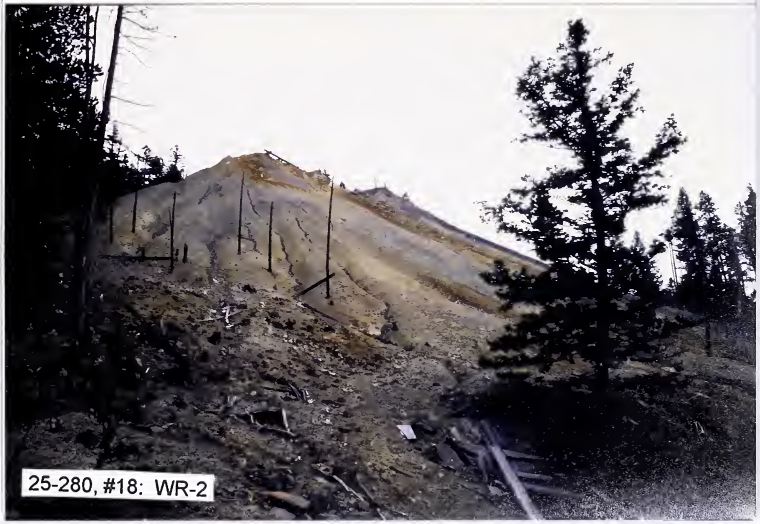
SITE SAFETY

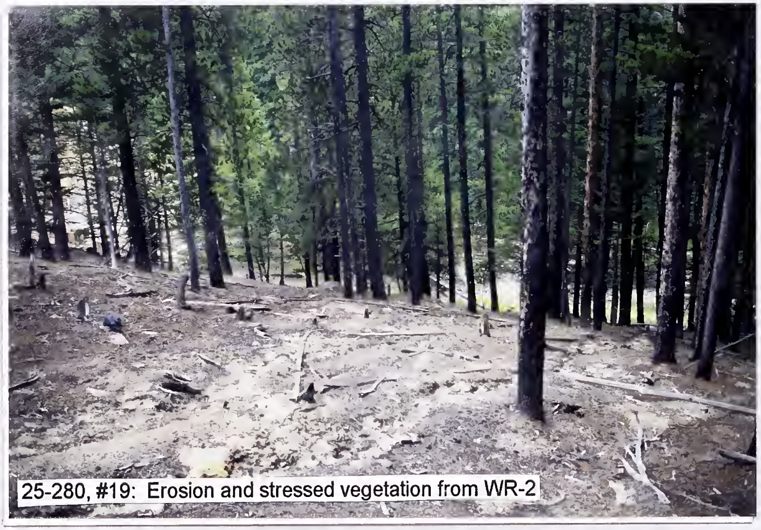
LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	120
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	220
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	17
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**18.70**

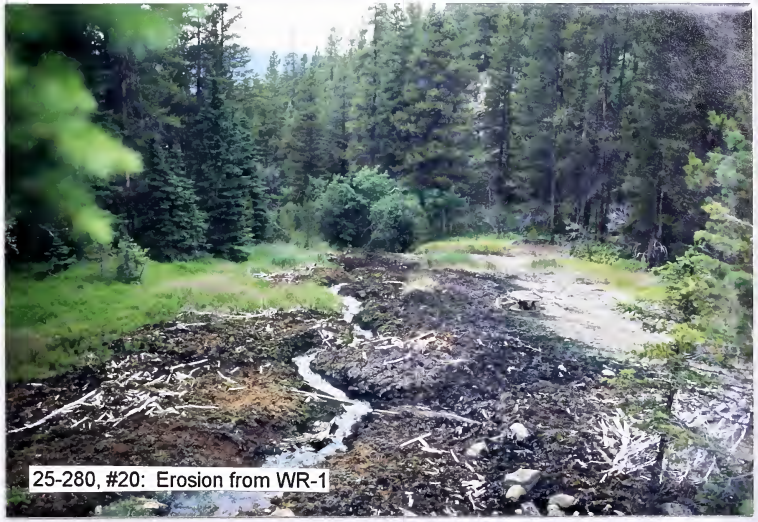

25-280, #15: WR-6

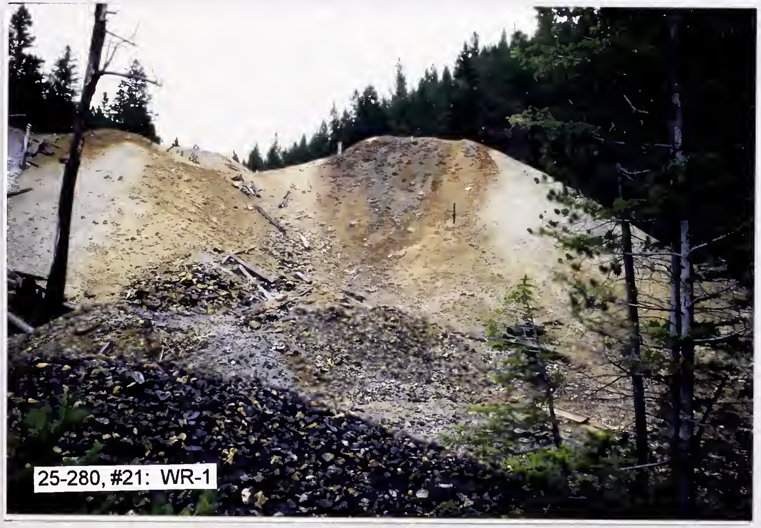

25-280, #16: WR-7

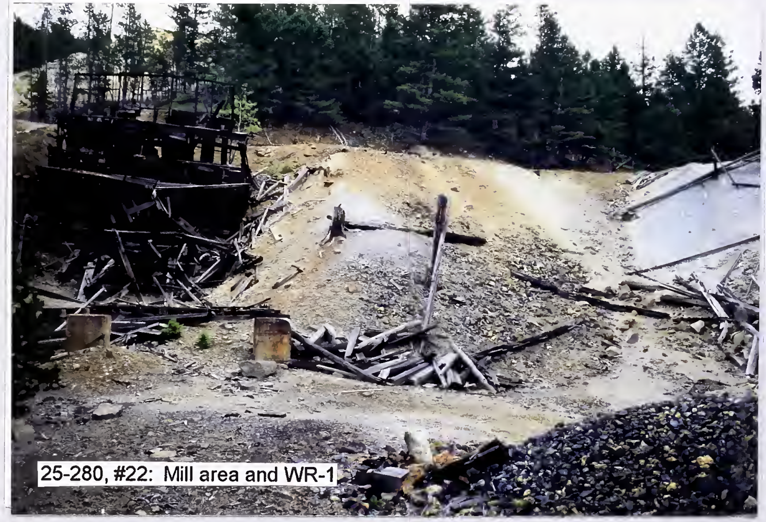

25-280, #17: Adit discharge


25-280, #18: WR-2


25-280, #19: Erosion and stressed vegetation from WR-2


25-280, #20: Erosion from WR-1


25-280, #21: WR-1


25-280, #22: Mill area and WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: SE SE S13 PA#: 25-294

Date: August 19, 1993 Time: 1030-1310

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Belanger, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Sunny; warm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #24: Placer tailings. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to site was gained by truck. Monitor Creek appears to be impacted above the placer from unverified upgradient sources.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Determine if the site contributes to sediment load of Monitor Creek. If impacts exist, enhance vegetative buffer and streambank stabilization.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SE SE S13 PA#: 25-294

Legal Description: T 8N ;R 6W ;Sec. 13 , SE1/4 SE1/4 ___1/4

County: LEWIS & CLARK Mining District: RIMINI

Latitude: N 46° 26' 12" Longitude: W 112° 17' 12"

Primary Drainage Basin and Code: Tenmile Creek/10030101
Secondary Drainage Basin: Monitor Creek

USGS Quadrangle map name(s): Three Brothers

Mine Type/Commodities: Placer/Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Mark McCormick, Box 938, Helena, MT 59624; Helena National Forest.

Relationship to other mines/sites in the area/district: Approx. 1 mile to the west of the Sure Thing mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6800', Slope 5°,
Aspect Northeast

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 1.5 acres.
Dimensions: 110' x 610'

Predominant vegetation types: Willow, Lodgepole pine, kinninick

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Walk-in approx. 300 yds.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in drainage of perennial Monitor Creek, which flows north away from the site. Monitor Creek meets perennial Tenmile Creek approx. 1 mile from the site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available. Artifacts present indicate the work was conducted in the early 1900's.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment___

Adits - Yes___, No X, # ___, Comment___

Pits - Yes___, No X, # ___, Comment___

Placers - Yes X, No___, # 1, Comment___

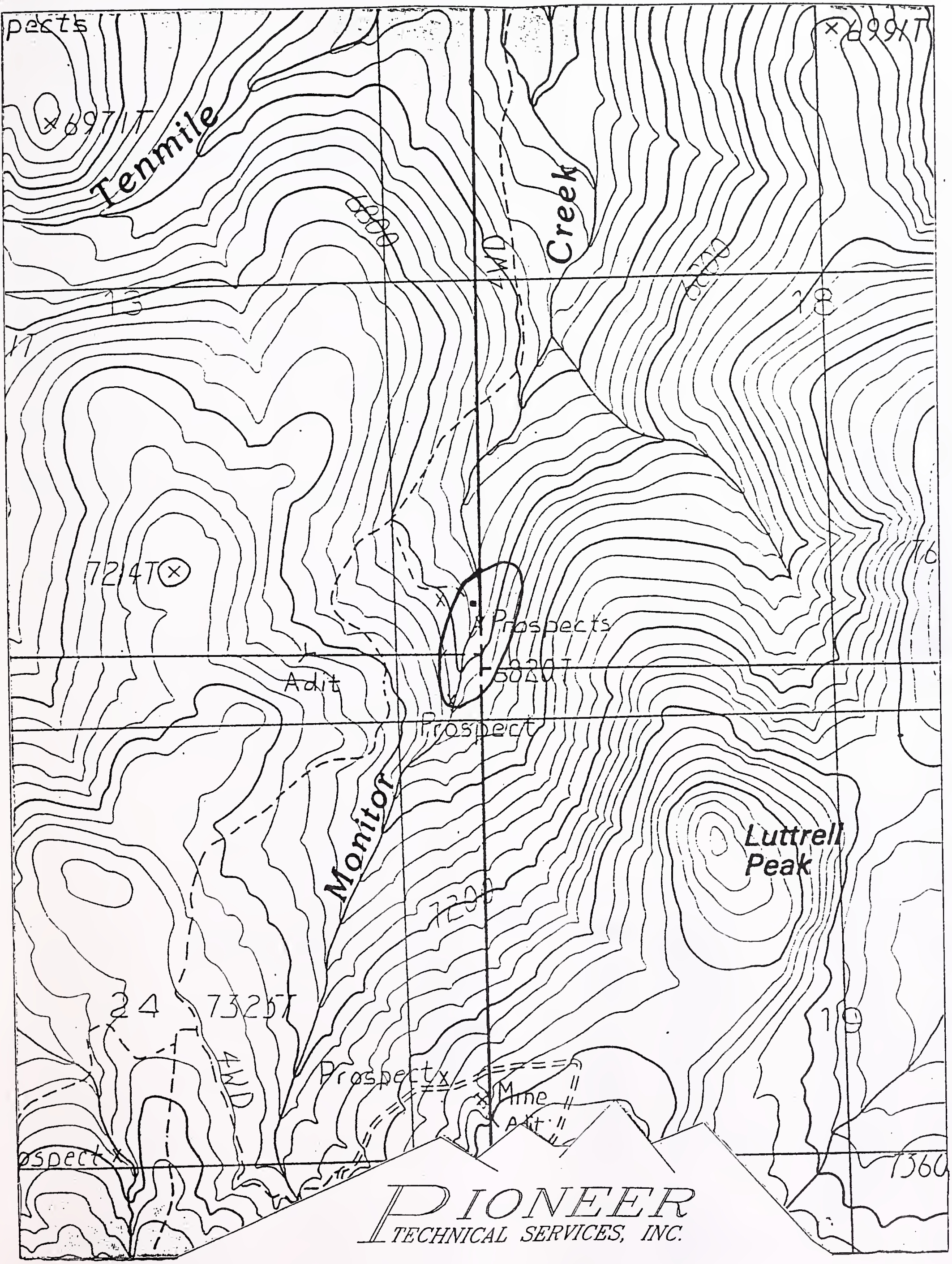
Other - Yes___, No X, # ___, Comment___

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill X; Number and names of mines that supplied mill feed:___

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Possible Hg-amalgamation

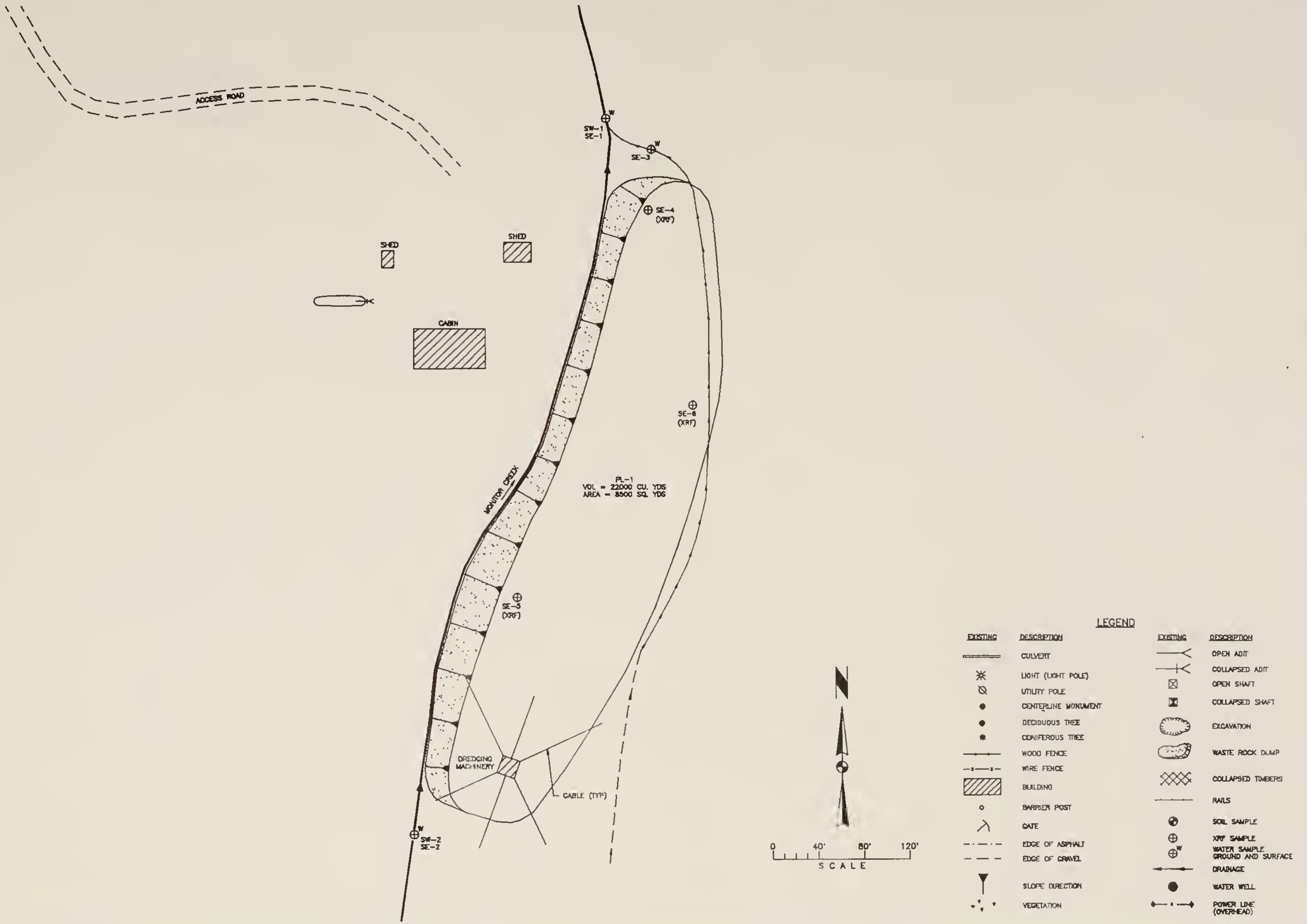


PIONEER
TECHNICAL SERVICES, INC.

SE SE S13, P.A. NO. 25-294

T08N, R06W, SECTION 13

SCALE: 1" = 1000'



DRAWN MWC DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SE SE SECTION 13 PA# 25-294
RIMINI DISTRICT LEWIS AND CLARK COUNTY

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Rocks

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Placer piles as high as 20 feet; no stratification.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry, except along streambank.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundment

Comments on potential for mitigation: Stabilize streambanks.

SOURCE INVENTORY FORM

SAMPLERS: Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
PL-1	OTH	22,000	Placer dredge piles	None	N/A	N/A	N/A	N/A	N/A

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* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Samples of the placer tailings were collected as sediment samples and logged on the surface water inventory form. No background sample was taken due to lack of undisturbed sediment.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 5 miles?: Yes_X_, No___;
Number of well logs: 259

Distance to nearest well used for drinking? Approx. 4 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X__.
Does not appear to be a source for contamination.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Monitor Creek and a small side channel to Monitor Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Placer tailings in stream

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 1.6
High Flow: 10 cfs , Average Flow: 1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Monitor Creek flows right through the placer tailings.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Drinking water supply (Tenmile Creek); fishery, wetlands, T&E - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? >1000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Stream was turbid both upgradient and downgradient of the site, with a high sediment load not attributable to this site.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downgradient on Monitor Creek	5.32	120	-25.1	9.7	< 10	1.7 cfs (M)	25-294-SW-1	08/19/93 1119	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downgradient on Monitor Creek	N/A	N/A	N/A	N/A	N/A	N/A	25-294-SE-1	08/19/93 1119	T-Metals
SW-2	SW	Upgradient on Monitor Creek	5.14	120	-5.7	-5.7	< 10	1.5 cfs (M)	25-294-SW-2	08/19/93 1223	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upgradient on Monitor Creek	N/A	N/A	N/A	N/A	N/A	N/A	25-294-SE-2	08/19/93 1223	T-Metals
SW-3	SW	Seepage flowing through placer tailings upon entering Monitor Creek	7.89	60	-75.4	10.7	NM	0.011 cfs (M)	N/A	N/A	Field Parameters
SE-3	OTH	Placer tailings in seepage drainage	N/A	N/A	N/A	N/A	N/A	N/A	25-294-SE-3	08/19/93 1239	T-Metals
SW-4	SW	Seepage at start	7.11	55	-71.0	7.1	NM	0.007 cfs (M)	N/A	N/A	Field Parameters
SE-4	OTH	Placer tailings sediment north end	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-5	OTH	Placer tailings sediment center east side	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-6	OTH	Placer tailing sediment north of dredge machinery west side	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres

Wetlands present: Yes X, No ___, Describe: Monitor Creek flows through site with wetlands approx. 150 feet from tailings.

Carbonate rocks/soils: Yes ___, No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1.25 miles - possibly recreational

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
PL-1	None	Dry	76,500	61,000	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes X , No___, Describe: Litter present, cabin appears to be used occasionally.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment____
Wilderness Area - Yes___, No X , Comment____
T&E Species Habitat - Yes X , No___, Comment Peregrine Falcon
Bat Habitat - Yes___, No X , Comment____

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low X
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:____

Hazardous structures: Yes___, No X , Number____, types and locations: Structures on the site are maintained in good condition.

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No X , Number____, types and locations:____

Fire and/or Explosion hazards: Yes___, No X , Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for SE SE S13, Prepared by Robert Peccia and Associates, July 29, 1988.

USGS, Topographic Map, Three Brothers, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

SE SE S13
PA NO. 25-294

SE SE Section 13 PA# 25−294
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 08/19/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25−294−SE−1	9.48 J	7.44 J	0.6 U	2.18 U	1.53 U	8.5 J	5290 J	0.056 J	62.2 J	2.84 U	59.4 J	6.88 U	31.1 J	NR
25−294−SE−2	10.3 J	6.37 J	0.6 U	2.42 U	2.25	7.68 J	5560 J	0.126 J	34.3 J	3.16 U	29 J	7.66 U	25.9 J	NR
25−294−SE−3	5.86 J	12.1 J	0.5 U	1.96 U	1.39	4.5 J	3570 J	0.212 J	80.3 J	2.56 U	15 J	6.2 U	52.2 J	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25−294−SW−1	1.51	29.3	4.37	9.7 U	6.83 U	13.2 J	261	0.12 U	118	12.7 U	10.5 J	30.7 U	264 J	22
25−294−SW−2	1.49 U	32.8	4.73	9.7 U	6.83 U	15.5 J	300	0.12 U	139	17.4 J	11.6 J	30.7 U	299 J	23.6

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS		CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
25−294−SW−1	81	<	5.0	29	0.16	NR
25−294−SW−2	83	<	5.0	33	0.16	NR

LEGEND

SE1 − Sediment downgradient on Monitor Creek.
SE2 − Sediment upgradient on Monitor Creek.
SE3 − Placer tailings in seepage drainage.
BACKGROUND − From the Red Water (25−007−SS−1).

SW1 − Downgradient on Monitor Creek.
SW2 − Upgradient on Monitor Creek.

XRF ANALYSIS RESULTS

SE SE S13
PA NO. 25-294

Mine Name: SE SE Section 13 PA# 25-294
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
25-294-SE-3		14980.6	2974.91	1091.53		717.302 *	15628.5	220.51 *	51.1824 *	109.289 *		243.348
25-294-SE-4		23916.7	2112.53	487.35	188.684 *	556.73 *	6745.64		43.9126 *	64.9519 *	24.7185 *	166.754
25-294-SE-5		30043.1	1410.7	333.132 *		699.403 *	8034.62		70.844 *	59.2124 *	26.4453 *	121.343
25-294-SE-6		23545.2	3233.79	572.574		536.71 *	10186.1		43.5148 *	99.9047 *		217.84

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
25-294-SE-3	129.622				194.041			525.616		13.3499 *	43.975
25-294-SE-4	143.44				217.514			395.824		33.9906 *	56.5766
25-294-SE-5	129.079				267.066			337.3		37.6779 *	61.8049
25-294-SE-6	140.844				213.88			448.72		26.8221 *	57.2395

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SE SE S13
PA NO. 25-294

AIMSS SCORESHEET

SITE NAME: SE SE S13
PA NUMBER: 25-294

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		259
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	259.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0

SURFACE WATER PATHWAY

LINE NO.				
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
16		DRINKING WATER POP'N		2450
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	2474
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0

AIR PATHWAY

LINE NO.				
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0

DIRECT CONTACT PATHWAY

LINE NO.				
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0

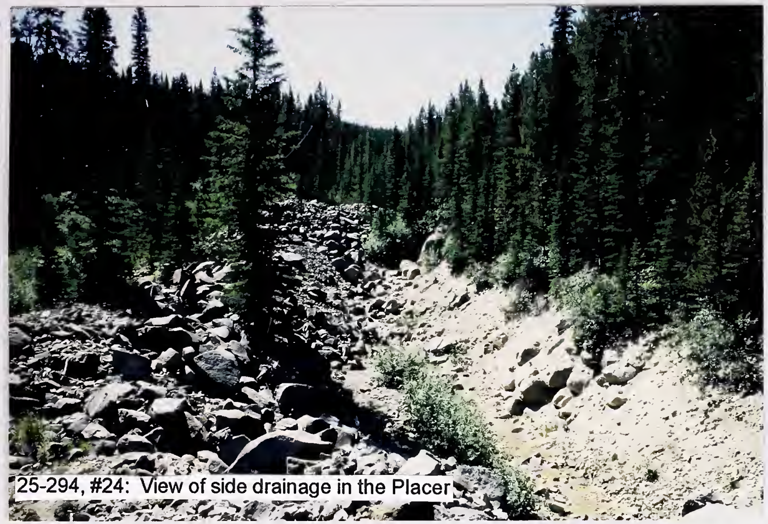
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.00**

SITE NAME: SE SE S13

PA NUMBER: 25-294

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**



25-294, #24: View of side drainage in the Placer